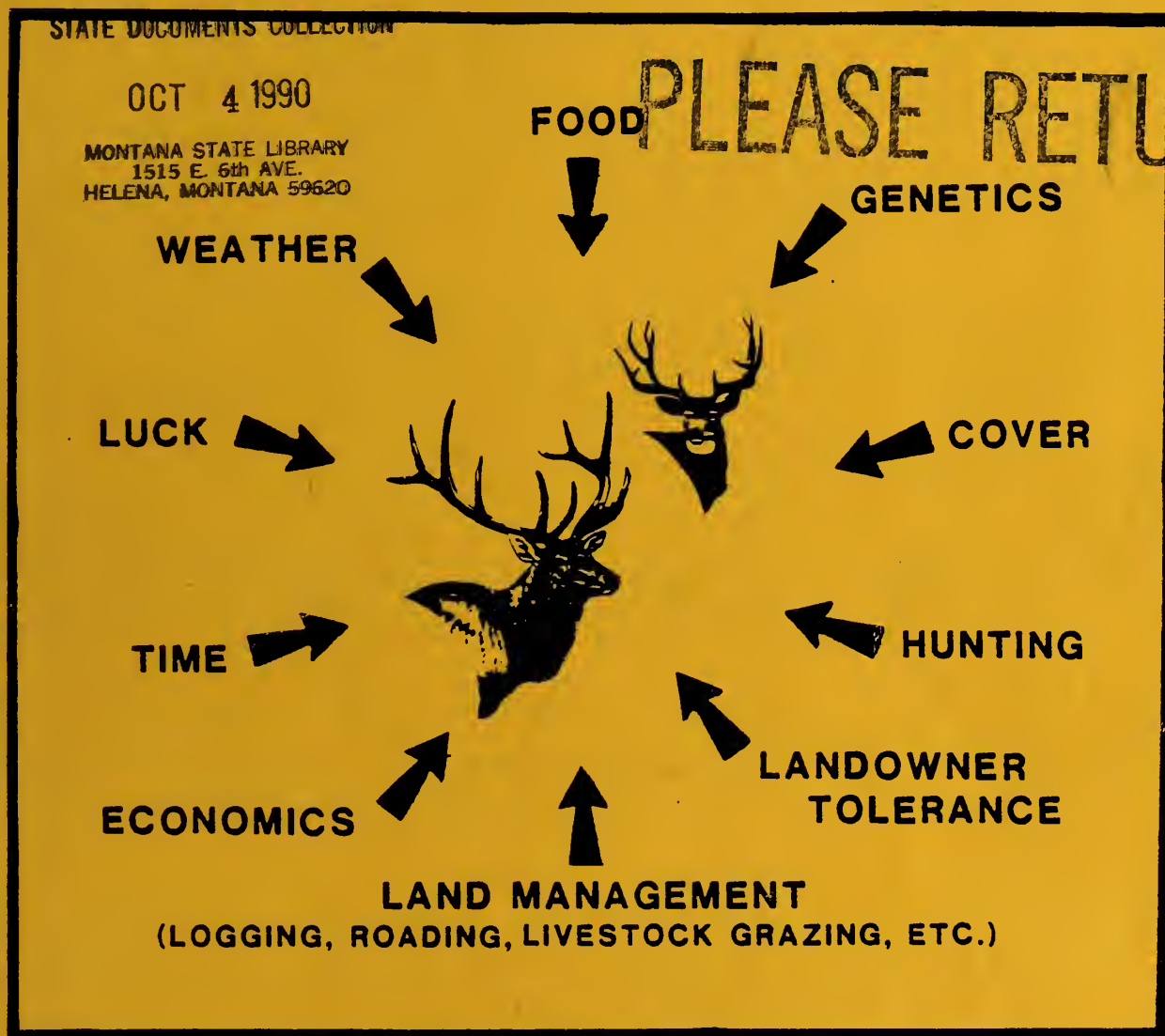


ANTLERED ELK AND DEER MANAGEMENT IN MONTANA:

PAST TRENDS AND CURRENT STATUS



A SPECIAL REPORT FOR THE FISH AND GAME COMMISSION

December, 1985

PREPARED BY THE WILDLIFE DIVISION



Montana Department of
Fish, Wildlife & Parks

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INTRODUCTION


A major change in deer and elk management occurred during the later 1940's and early 1950's in Montana. This involved changing hunter attitudes from bucks- and bulls-only hunting to either-sex hunting. It expanded hunting opportunities by allowing hunters to decide whether they wanted to harvest a trophy or other animal. That diversity of opportunity, a veritable Montana tradition, has provided freedom of choice for sportsman throughout the state.

This change in management also provided wildlife managers with a valuable tool for more closely regulating deer and elk herd sizes. It has been used extensively to help minimize damage to agricultural crops by some herds.

Recently, some sportsmen have expressed concern that "there aren't as many big bucks/bulls as there used to be." This perception may be related to the fact that deer and elk populations are at 20th Century highs. With larger numbers of animals available, some hunters' thoughts have changed from "just getting a deer or elk" to "what kind of deer or elk do I want this year." All in all, it's a nice problem to have.

In March, 1985 the Montana Fish and Game Commission asked the Department's Wildlife Division to evaluate the status of "big bucks and bulls" available to hunters. This report responds to that request, and identifies some of the trade-offs in current deer and elk management programs.

Hunting regulations alone cannot completely address this issue. The front cover of this report makes this point. A separate report could be made on each of the topics listed, however, we have focused our discussion on the topic with which we have the most control, hunting regulations.



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BIG BUCKS

The Issue

This informational summary was prepared for the Commission by members of the Wildlife Division to address recent interest by certain public sectors in establishment of special "quality hunting" regulations. From our cumulative experience with the hunting public, we believe that "quality hunting" means something different to every hunter, and that "quality" may have more to do with a total recreational experience than with the actual harvest of a deer, whether it be antlered or antlerless. It is our consensus that the best way to provide "quality" to the hunting public is to maintain a diversity of recreational opportunities from which sportsmen can choose. We are therefore of the opinion that the real issue facing the Commission is not "quality", but "availability of big bucks".

This discussion primarily addresses mule deer. In many areas of Montana, particularly east of the continental divide, white-tailed deer populations are underutilized. However, in much of western Montana whitetails are the primary deer species and comprise the bulk of the deer harvest. Many of the principles discussed in this manuscript may also pertain to white-tailed deer in these areas.

Is there a shortage of large bucks in Montana Deer Populations?

The available data indicates that there are as many or more big buck deer in Montana now than at any time in the past. Figure 1 and Table 1 indicate that on a statewide basis, more bucks were harvested in 1983 and 1984 than in any other year except 1957. The perception that there are fewer big bucks now than there used to be is valid in spite of this fact. This perception is the direct result of increased numbers of hunters (Table 2) and the resulting reduced probability that a given hunter will find a big buck. The number of deer hunters in Montana have increased 90% from 86,830 in 1950 to 164,290 in 1984. The number of big bucks in Montana deer populations would have had to have almost doubled to give an individual hunter the same opportunity that he had 34 years ago. The only sure way to maintain the same buck/hunter ratio as in previous years is to decrease competition by limiting hunter numbers.

Very few areas in Montana have the consistent, long-term data that is necessary to answer questions about changes in hunter harvest of big bucks. Figures 2-5 present the available data from areas where information was collected consistently over a period of years. The data from the Darby check station in Region 2 indicates a variable trend in numbers of 4X4 bucks harvested. Peak numbers of big bucks were harvested in the late 1960's, 1979-81, and possibly may be starting to rise to another peak at present. Low points were in 1975 and 1983. The data from the Bonner check station in Region 2 show that more 4X4 point or greater mule deer bucks have been harvested during the 1980's than at any time since 1967. Although not presented in a figure, the same trend is true for white-tailed deer from this check station.

Data from the Augusta check station (Fig. 4) indicate that numbers of 4X4 point bucks harvested during 1982-84 have been as high or higher than they were back to 1977. In addition to increased numbers of bucks available in 1984, a weather related factor may also explain part of the large increase in 1984.

Data from the Canoe Gulch check station in R-1 (Fig. 5) indicate a steady increase in the number of 3-1/2 year and older mule deer bucks harvested during the past 5 years. The same trend is evident for white-tailed deer from this check station.

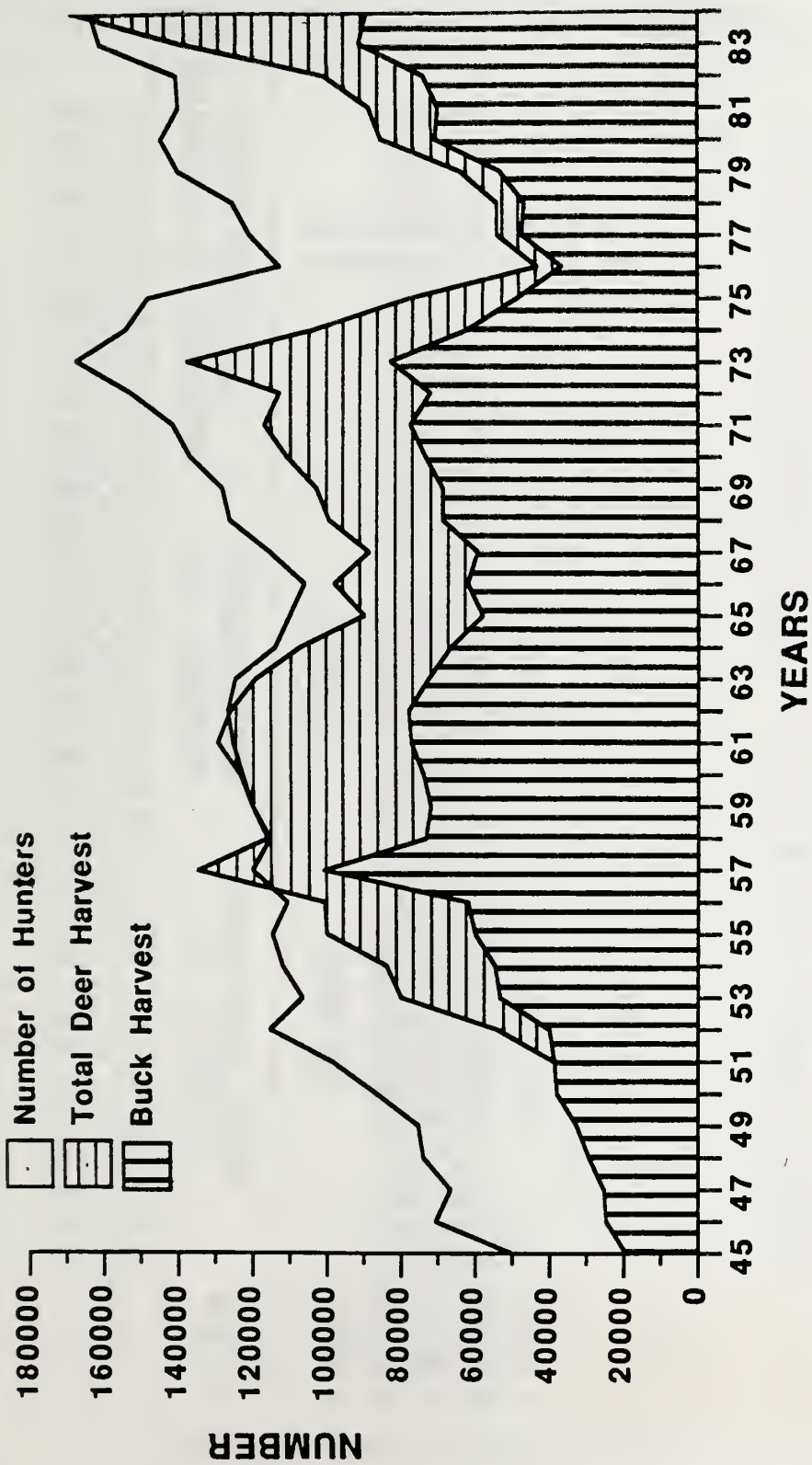


Figure 1. Statewide deer harvest and hunter numbers.

Table 1. Total Deer Harvest, Buck Harvest, and Number of Hunters, 1945-1984.

Year	Number of Hunters	Total Harvest	Buck Harvest
1945	50,000	19,500	19,500
1946	70,570	24,700	24,700
1947	66,370	25,600	25,600
1948	73,750	29,500	29,500
1949	75,350	32,400	32,400
1950	86,830	38,300	38,300
1951	98,870	39,000	39,000
1952	115,230	53,800	40,000 74%
1953	106,630	80,000	53,500 66
1954	112,000	84,300	55,000 65
1955	114,500	100,000	60,000 60
1956	110,500	100,500	62,000 62
1957	120,000	134,600	100,950 - 75
1958	115,130	116,000	73,080 - 63
1959	119,870	120,300	72,180 - 60
1960	122,490	123,500	74,100 - 60
1961	125,010	129,100	77,460 - 60
1962	126,740	125,700	77,935 - 62
1963	124,565	119,095	72,650 - 61
1964	113,990	107,365	66,565 - 62
1965	109,830	90,140	57,690 - 64
1966	106,180	98,105	61,805 - 63
1967	115,185	88,640	59,390 - 67
1968	125,710	99,250	68,480 - 69
1969	128,180	102,800	68,875 - 67
1970	136,905	110,990	73,255 - 66
1971	141,245	116,715	77,030 - 66
1972	152,545	112,995	72,315
1973	167,360	137,440	82,465
1974	154,110	103,655	62,195
1975	148,110	77,495	48,820 - 62
1976	112,785	43,290	36,795 - 85
1977	120,800	54,145	47,645 - 88
1978	125,055	53,935	46,925 - 87
1979	139,895	64,135	53,230 - 83
1980	144,590	85,165	70,685 - 83
1981	139,915	88,795	69,695 - 78
1982	140,385	100,340	73,845 - 73
1983	161,050	139,465	91,165 - 65
1984	164,290	169,650	89,190 - 52%
1985	177,150 (190,935)	117,430	72,177 - 61%
1986	171,782 (147,895)	105,347	71,468 - 68%
1987	171,200 (151,746)	103,675	70,503 - 68%
1988	174,117		

YEAR	NUMBER OF DEER HUNTERS	NUMBER OF BIG BUCKS	NUMBER OF HUNTERS PER BIG BUCK
1950	86,800	5000	17
1960	122,500	5000	25
1970	136,900	5000	27
1980	144,600	5000	29
1984	164,300	5000	33
1984	164,300	9465	17

TABLE 2. How changes in hunter numbers affects "big buck" perception.

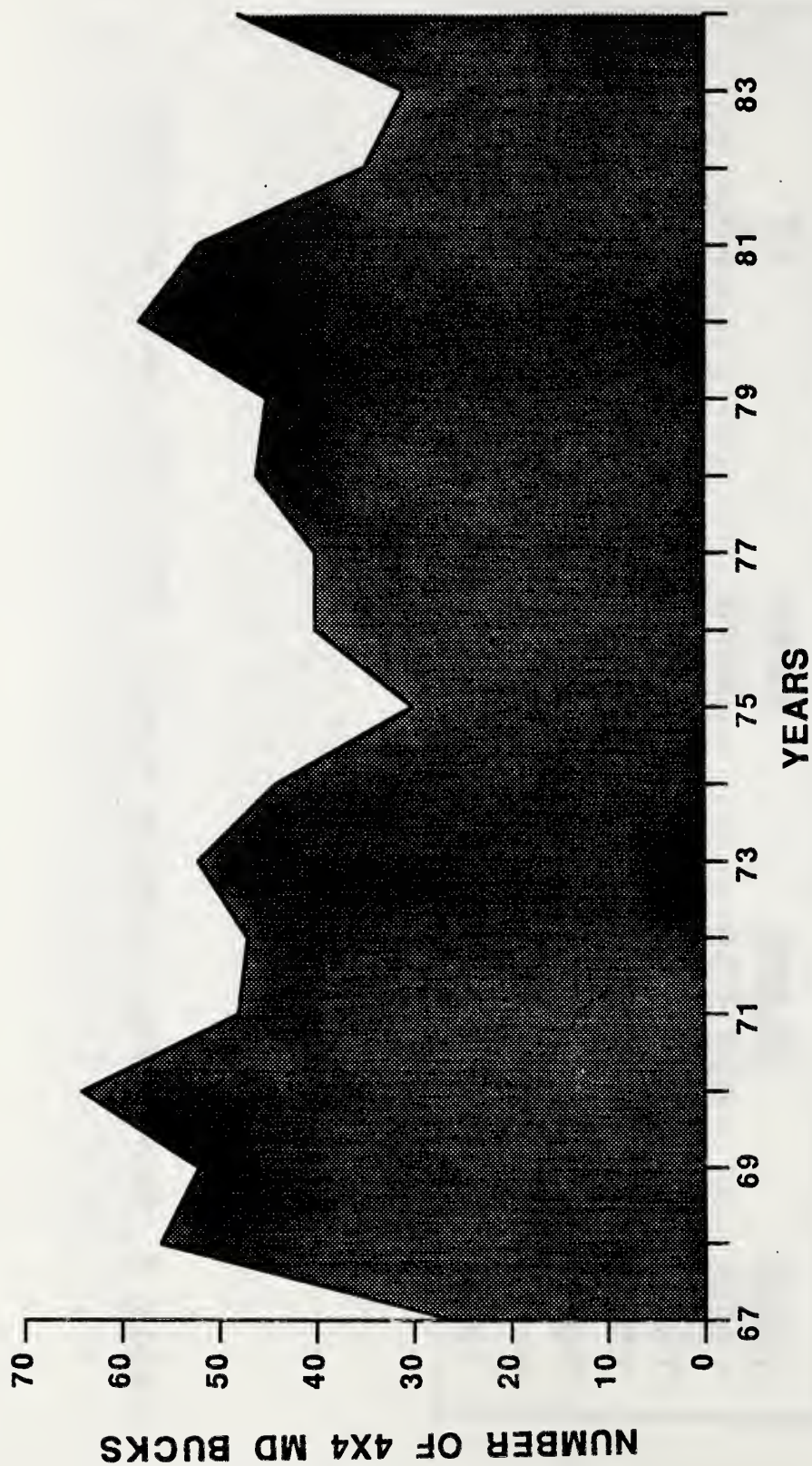


Figure 2. Darby Check Station, 1967-1984.

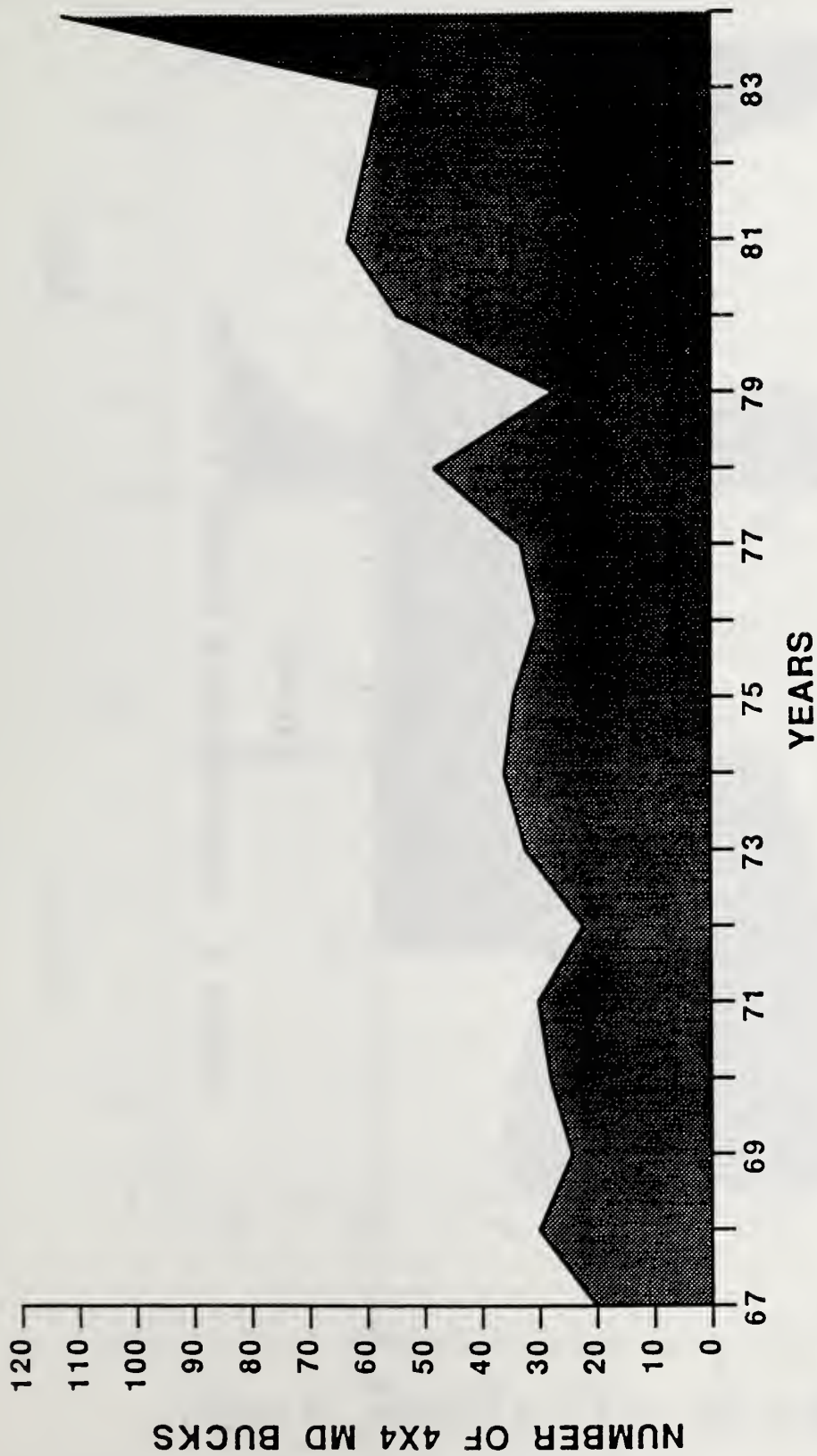


Figure 3. Bonner Check Station, 1967-1984.

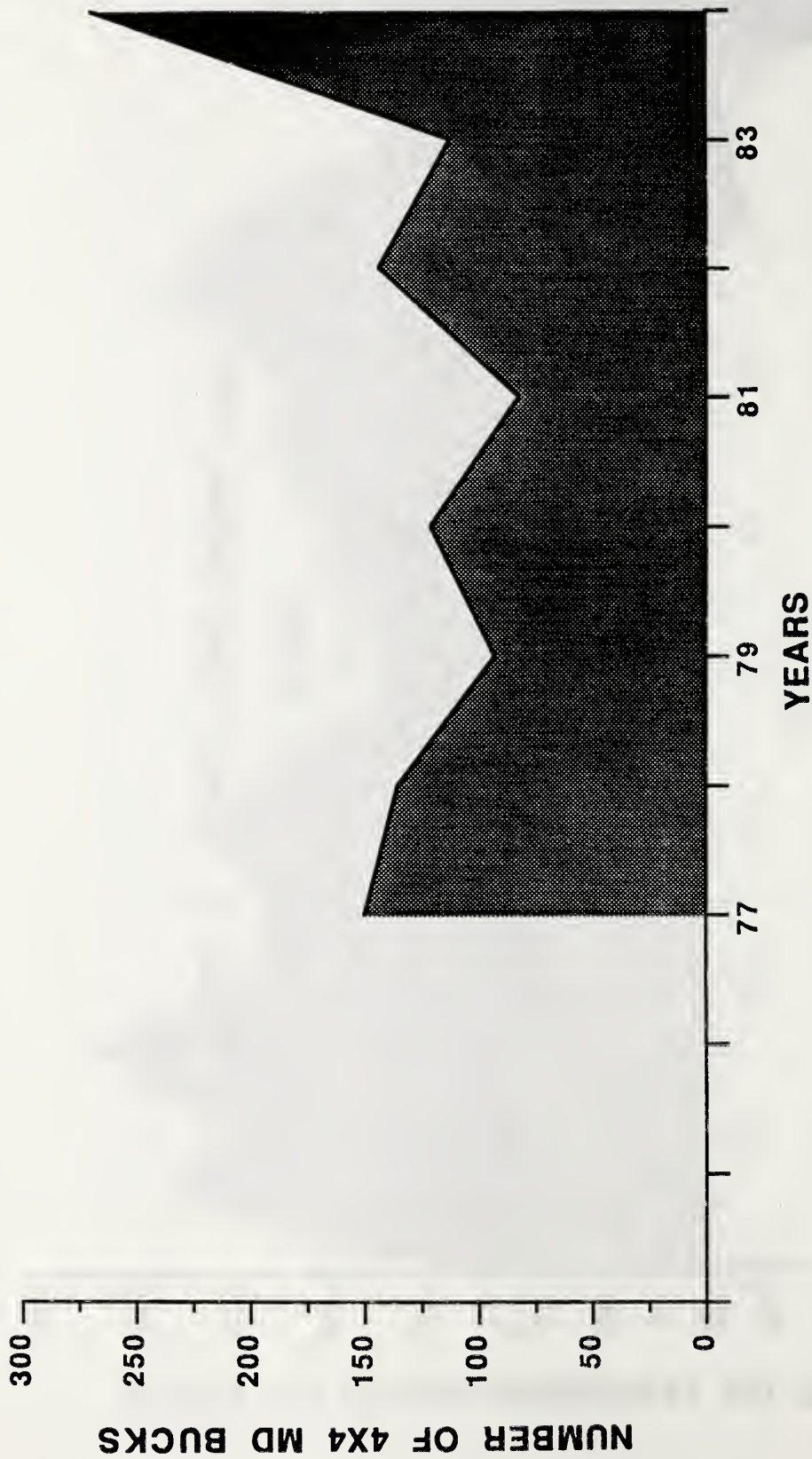


Figure 4. Augusta Check Station, 1977-1984.

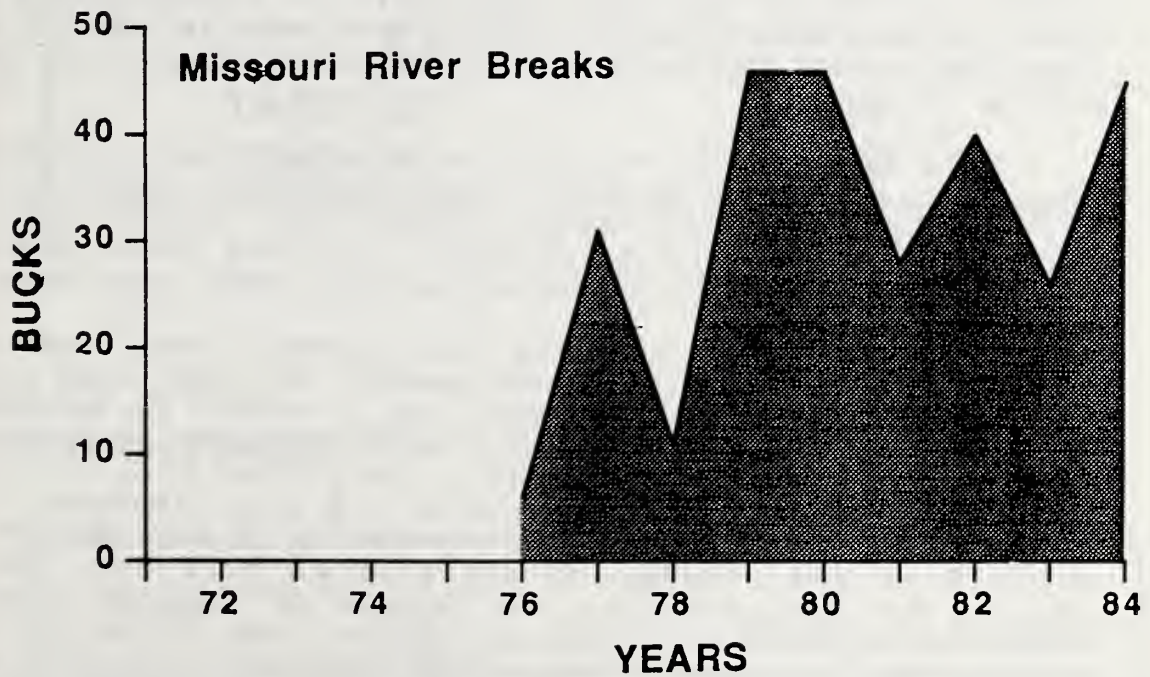
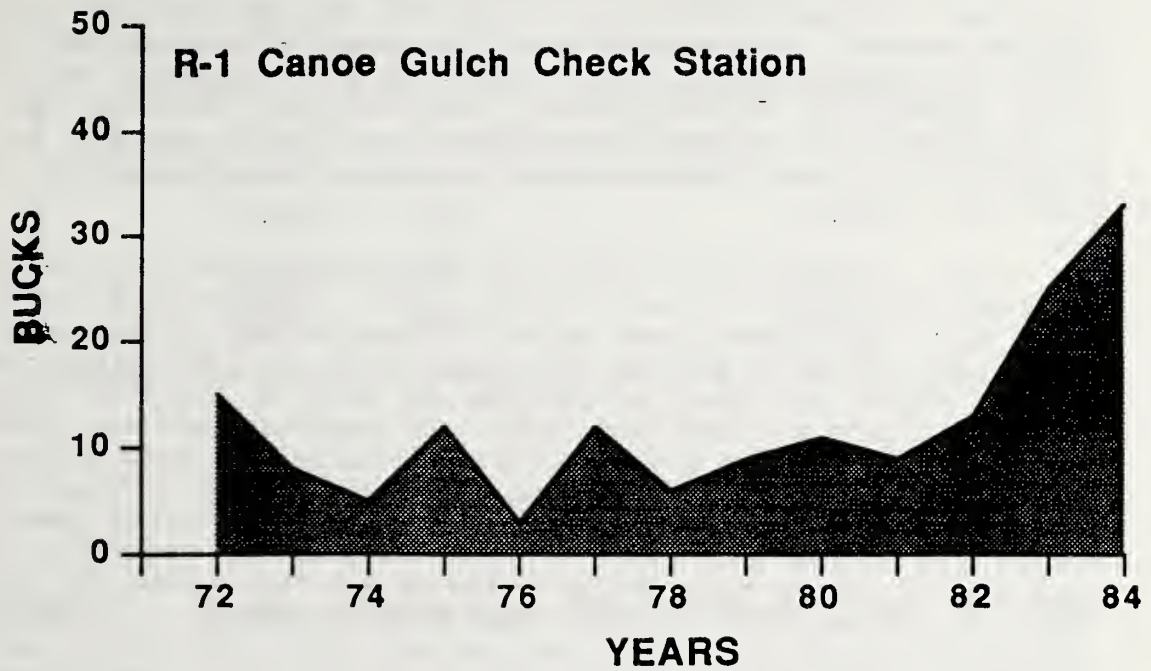


Figure 5. Number of 3 1/2+ MD Bucks killed.

Data from the Missouri River Breaks (Fig. 5) indicate that the number of 3-1/2 year and older bucks has varied, but remained higher during 1979-1984 than during 1976-78. Data are also available from this area for the period 1960-1964, a period often referred to as "the good old days" by some. These data indicate that 143 bucks aged 3-1/2 years and older were harvested on the study area during 1960-64 and 185 during 1980-84. Thus more big bucks were harvested during the recent 5 year period than during a 5 year period in the good old days.

Data are also available on antler size on this area at various periods of time (Tables 3-5). These data indicate that the 3-1/2 year and older bucks actually had smaller diameter antlers during 1948-49 than during more recent times. There had been no hunting on much of the area for 13-14 years prior to 1948 and 1949. If reduced hunting pressure alone increased the availability of large antlered bucks, it should have been apparent here. The data also indicate that the number of points per side for 3-1/2 - 6-1/2 year old bucks was somewhat lower in 1980-84 than in 1960-64. This may be at least partially related to the severity of the drought during the 1980s. The data in Table 5, comparing antlers during 1978-80 (good years) with 1984 (very severe drought), indicate the cumulative effect the drought had on antler points per side on deer in the Missouri River Breaks. This also points out that people's perception of smaller bucks than usual the last few years in northcentral and eastern Montana is correct. While there were as many or more older bucks than before, their antlers were smaller, at least during 1984.

Data from check stations in Regions 5 and 7 indicate that the percentage of 3-1/2 year and older males in the harvest has been increasing during the period 1980-84. Harvest questionnaire data indicate that this means that the numbers of these bucks harvested has also been increasing.

While we realize that the very largest trophy heads may not be the main concern to most people, at least some people are concerned about this subject, so it should be addressed. The largest typical Montana mule deer ever recorded is number 87 in Boone and Crockett records. Only 10 of 318, or 3%, of typical mule deer in B&C records are from Montana. The largest non-typical mule deer is number 35 in B&C records and only 15 of 254, or 6%, of non-typical mule deer in B&C records are from Montana. The largest antlers for Montana white-tailed deer fare better, number 6 and 13 for typical and non-typical respectively in B&C records. Overall, only 18 of 456 (4%) typical and 16 of 313 (5%) non-typical white-tailed deer from Montana are in the Boone and Crockett record book.

Table 3. Antler size comparisons, 1948 - 1984.

% OF 3 1/2+ BUCKS - MRB - WITH ANTLER BEAM DIAMETER GREATER THAN 1.33 INCHES	
1948 - 49	22%
1960 - 64	38%
1980 - 84	30%

Table 4. Antler points per side, 1960-64 and 1980-84.

NUMBER OF ANTLER POINTS PER SIDE - MRB 3 1/2 TO 6 1/2 BUCKS	
1960-64	3.98
1980-84	3.75

Table 5. Drought effect on antler points per side - MRB.

YEAR	AGE			
	1 1/2	2 1/2	3 1/2	4 1/2+
1978-80	2.07	3.26	3.70	4.11
1984	1.68	2.92	3.06	3.57

The indications are, that for whatever reasons, Montana mule deer do not produce world record type antlers. White-tailed deer may have more potential, but even here, Montana has never produced many of the world record class deer.

Records for Montana clearly indicate that a normal component of very large bucks for both mule deer and white-tailed deer have been harvested in the last 10 years as compared to the previous periods in "the good old days". Most of the recent large bucks have been taken since 1980, especially during 1983 and 1984.

The combination of all these data indicate that there has not been a general statewide lack of big bucks during the last few years. There are, however, specific areas in the state where opportunities to harvest large males are poor at present and these areas will be discussed in more detail later. One thing to remember is that this is the current status of buck hunting opportunities and it could change rapidly in central and eastern Montana as will be explained later. Also remember that this concern over the lack of "big bucks" came about at a time of peak numbers of total deer and bucks.

What is required to produce big bucks

Hunting is frequently cited as the over-riding factor controlling the number of large bucks in deer populations. While hunting can certainly have an influence, it's effect is not the same in all situations (Table 6). Preseason buck:doe ratios have averaged 50:100 in the heavily hunted Missouri River Breaks population which falls between the ratios recorded for unhunted populations in Glacier National Park and the Moiese Bison Range. Post season ratios along the moderately hunted west slope of the Bridger Mountains have averaged 25:100 over the last 10 years. The 16 Mile population in the Bridger Mountains is lightly hunted, but averages only 10 bucks:100 does post season. Other moderately hunted mountain ranges like the Garnets in Region 2 have only 5 bucks:100 does post season.

It is evident that at least 6 factors other than hunting pressure may affect the availability of bucks in Montana deer populations.

Table 6. Average Male : 100 Female Ratios in Hunted & Unhunted Mule Deer Populations

Unhunted Populations		Males/100 Females
Glacier National Park		43
Moiese Bison Range		66
Hunted Populations		
Missouri River Breaks	(PRESEASON)	50
Missouri River Breaks	(POSTSEASON)	27
West Slope Bridger Mts.	(POSTSEASON)	25
No. and So. 16 Mile	(POSTSEASON)	10
Garnet Mts. HD 291	(POSTSEASON)	5

1. Buck Mortality Patterns

Information from several sources show that even without hunting, the annual mortality rate for males is twice that of females. In the Bridger Mountains, the natural life expectancy of males seldom exceeds 8 years while females often live 12-14 years. The period of highest buck mortality is November through April. Bucks enter the breeding season in mid-November in the best condition of all deer, but enter the winter, one month later, in the worst condition of all deer. This depletion of body condition is most pronounced among large dominant males. During the month long breeding season they are constantly on the move, spend little time feeding, fail to select nutritious forage when feeding does occur, and experience injuries in dominance fights. In northern environments, severe winters can often result in the deaths of many yearling bucks and individuals older than 6 years. Management strategies designed to "stockpile" big bucks are generally ineffective for very long in northern latitudes.

2. Fawn Survival Patterns

At any point in time, the number of bucks or does in a deer population is directly related to the ability of fawns to survive during each of several preceding years. Fawn survival patterns tend to closely reflect environmental conditions. In the Prairie and Breaks Habitats of eastern Montana, the climate is extremely variable and fawn survival patterns also display much variation (Fig. 6). In these habitats, patterns of fawn survival are best described as

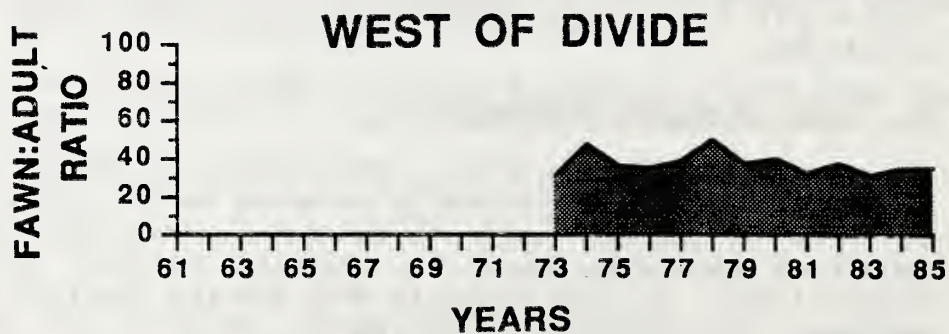
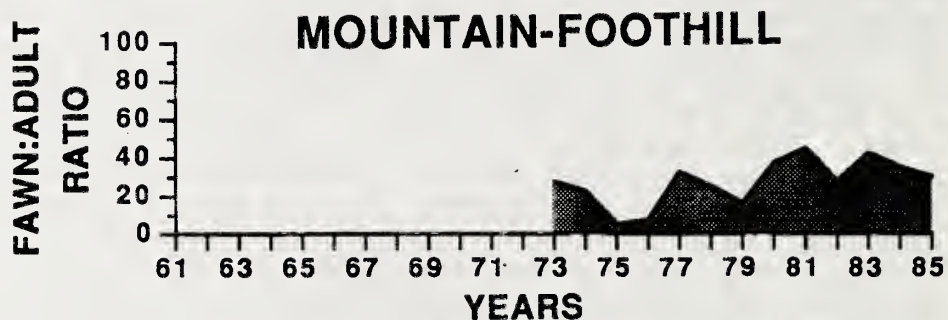
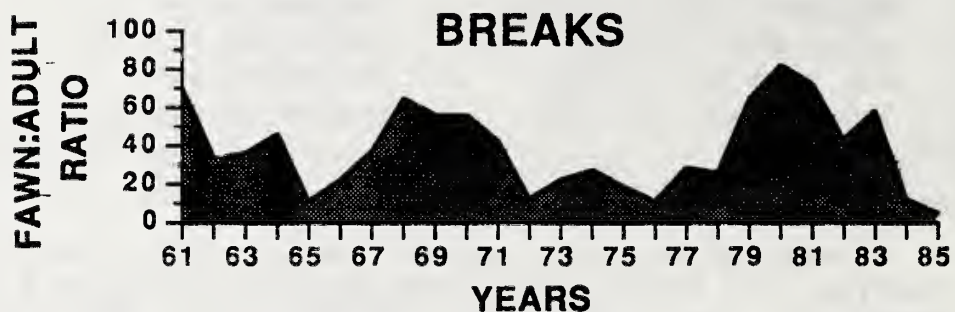
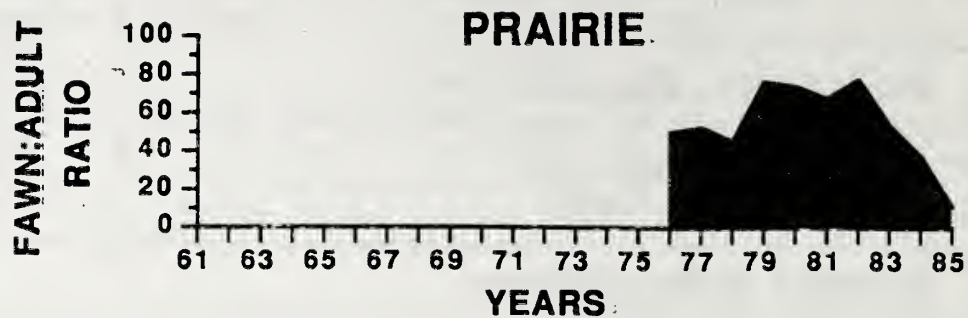


Figure 6. Fawn survival in four different environments.

periodic. Poor fawn survival generally occurs during a consecutive 2-3 year period, followed by several favorable years of high survival. As we move west, environmental conditions show less variation and consequently fawn survival patterns are more stable. Fawn survival patterns in the mountain foothills show less variation than the Breaks although smaller waves and troughs are still evident. Mule deer populations west of the divide show the least variation in fawn survival with only minor waves and troughs.

The following section explains how variation in fawn survival affected buck availability during an 8 year period in a mountain-foothill deer population.

3. Buck Age Structure

Figures 7 and 8 show the number of bucks in each age class on the west slope of the Bridger Mountains from 1975-1982. In the spring of 1975, a prominent "wave" existed in the buck age distribution. It was formed in two ways: 1) fawn survival was high during the years 1969-1972 meaning that in 1975 the 2, 3, 4, and 5 year old bucks were well represented 2) the severe winter of 1974-75 caused significant mortality of fawns, yearling bucks, and bucks 6 years and older. By 1976, the wave had reached those age classes (4, 5, 6) where a large number of bucks attain maximum antler size. During the fall of 1977, 60% of the adult males were killed by hunters. By spring 1978, the wave had totally collapsed after the remaining large 6-8 year bucks failed to survive the winter. Total buck numbers remained low from 1978-1981 with very few males in the big buck category. A strong upward trend in fawn survival did not begin until 1980 and peaked in 1983. In the 1982 histogram, the beginning stages of another "wave" is forming in the male age structure. This "new wave" gathered strength from good fawn survival during 1982-1984. Another peak in numbers of large males is expected to occur in fall 1986.

During at least 6 of the last 10 years, very few large bucks have been available in this typical mountain-foothill mule deer population. Because we can do little to alter fawn survival patterns, we must expect significant fluctuations in the availability of large bucks in populations east of the divide.

Another example of changes in the availability of 3 1/2 year and older bucks is illustrated in the Missouri River Breaks between 1981 and 1985 (Fig. 9). While this figure shows the increase in older bucks from 1981 to 1985, it also indicates that a decline is coming because of poor fawn survival in 1983-1985.

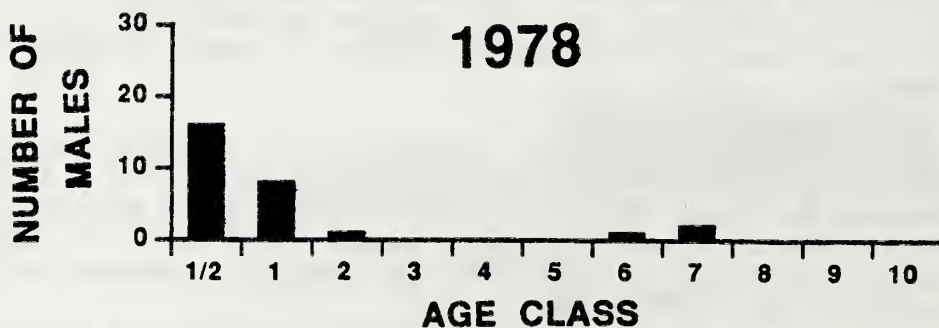
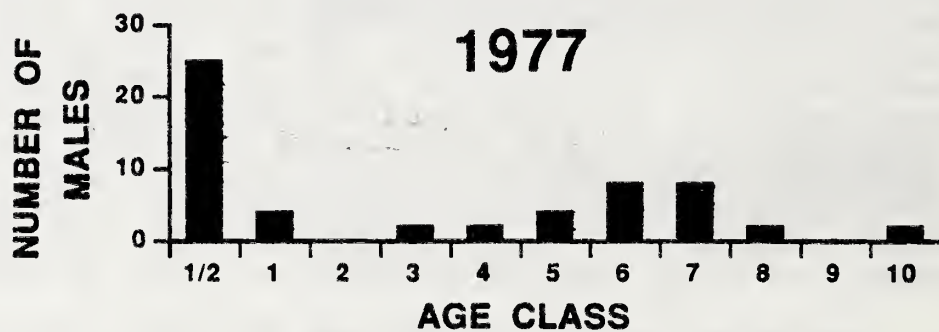
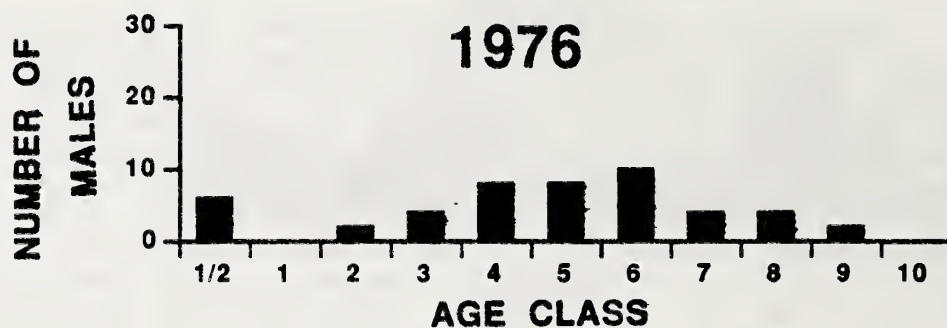
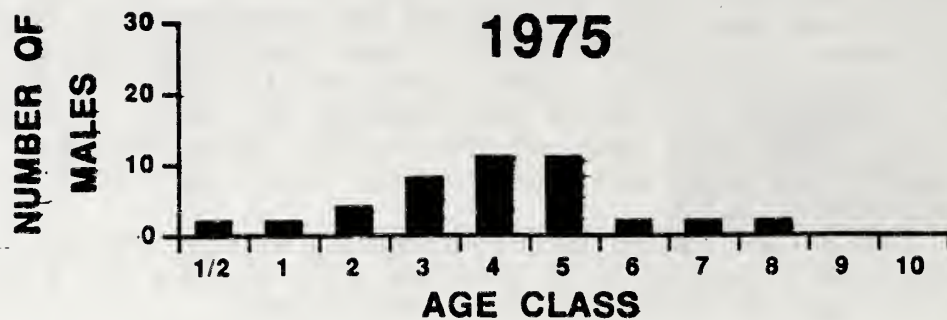


Figure 7. Buck Age Structure-Bridger Mountains.

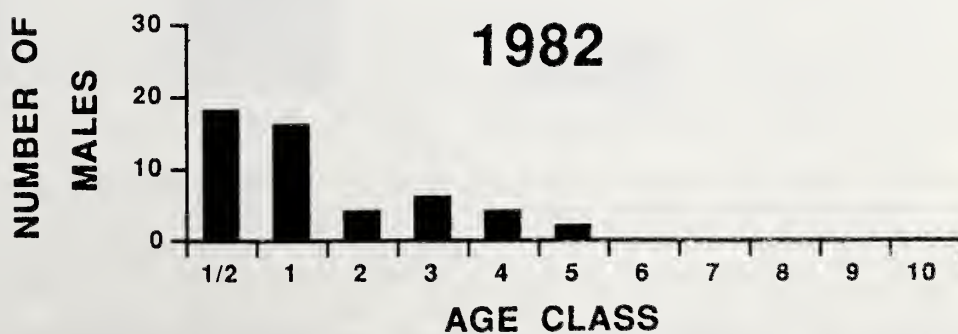
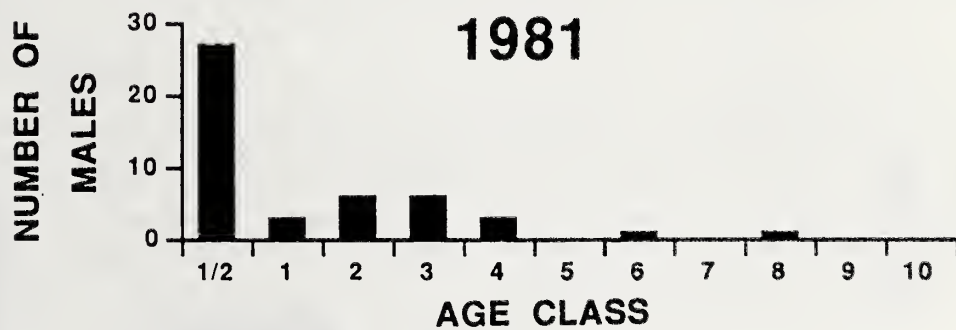
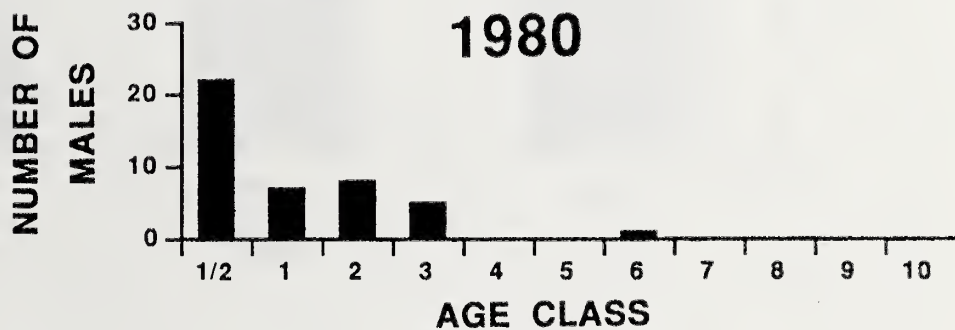
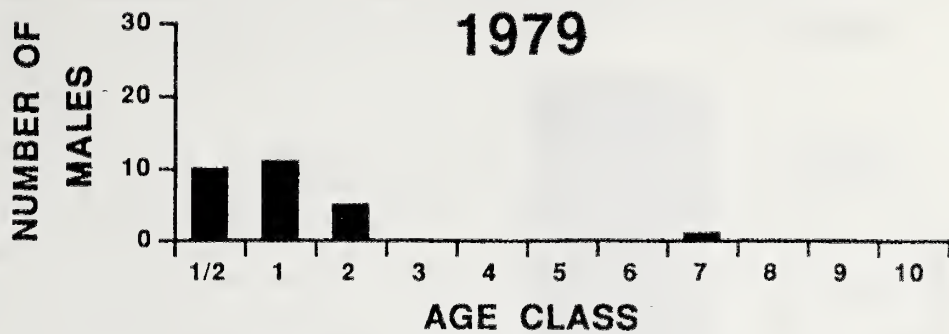


FIGURE 8. Buck Age Structure-Bridger Mountains.

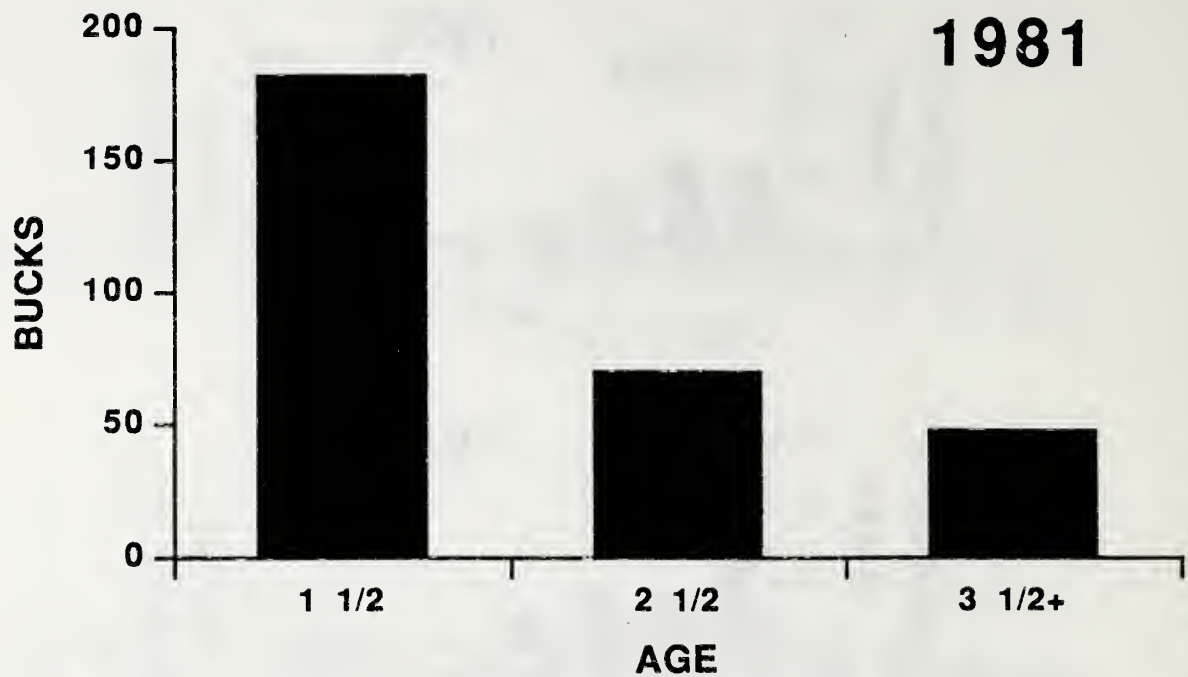


FIGURE 9. Preseason number of bucks, Missouri River Breaks study area.

In populations west of the Divide, fawn survival is more stable so "waves" in the male age structure may not be as severe and buck availability may be more constant.

4. Weather

Weather is another factor that can affect the availability and observability of bucks. In migratory deer populations the onset of severe weather causes deer to move to lower elevation winter ranges. Deer that move long distances or cross major divides during migration often return to winter ranges in October. This can make them vulnerable to heavy harvest where they move onto accessible, open, sparsely timbered winter ranges. Other mountain mule deer populations move to winter ranges in rugged high security habitat generally making them less vulnerable to heavy harvest. In these more secure habitats, weather conditions can strongly influence the hunter's perception of buck availability. For example, during 1976 in the Bridger Mountains, large antlered bucks reached a peak in numbers. However, weather was warm and dry during the fall causing very poor buck hunting conditions. Most hunters complained of a shortage of bucks. One year later, a combination of severe weather, early migration to winter ranges, onset of the rut, and high hunter turnout resulted in the estimated harvest of 60% of the adult male population. This occurred in what is normally considered to be high security deer habitat.

5. Buck Habitat

In the Bridger Mountains, buck:doe ratios display wide variation among the seven population units that have been studied. This variation seems to be poorly correlated with the level of hunting pressure. Moderately hunted populations along the west slope have higher buck:doe ratios than lightly hunted east slope populations. Although habitat security is generally higher on the west side, other factors may be important in causing this difference.

West slope populations display very little habitat overlap between bucks and does during the summer. Bucks live at low elevations in or below the foothill zone or at high elevation in the subalpine-alpine zone. Females almost exclusively live in the forest zone at middle elevations.

In contrast, east slope populations occupy only two habitat zones. The forest and the open footslopes. The subalpine-alpine zone is absent. The forest zone supports a high density of does and fawns. Bucks are scattered in small "pockets" within the forest zone or share the footslope zone with a resident component of the female population. Because

of this "crammed" distribution pattern, there may be fewer places for bucks to set up home ranges within east side populations.

Young collared bucks seem to leave east slope populations at a higher rate than recorded for west slope populations. This "drain" on the buck population could contribute to the lower buck availability that occurs along the east slope. These ideas need verification before we can assess the influence that buck habitat could have on their distribution and availability.

6. Genetics

Three factors are known to play an important role in producing a large antlered buck. 1) nutrition, 2) age, 3) genetics. Penned deer studies in Texas indicate that culling inferior "spike" bucks and protecting the larger yearlings could improve the antler characteristics of a deer herd. Experience in Texas indicates that this may be an unrealistic method to apply to wild populations. They found that application of culling practices in public hunting situations created more problems than it solved. Most hunters were not able to determine the quality of a buck through a rifle sight under normal field conditions and therefore could not tell whether a deer was a cull or not.

Another point to remember is that males contribute only half the genes to a fawn. The component that females contribute to antler characteristics is impossible to select for in the wild.

BIG BUCK HUNTING OPPORTUNITIES CURRENTLY AVAILABLE

Wildlife Division representatives from the seven MDFWP management regions have determined probable opportunity levels for harvesting a big buck in each hunting district based on check station data, population surveys, and/or the opinion of biologists. Hunting districts that probably average 15+ percent big bucks in the harvest are considered to have excellent opportunity, those having 6-14 percent offer moderate opportunity, and districts with 5 percent or less have poor opportunity. Region 3 personnel used 26+ percent, 16-25 percent, and 15 percent or less for the categories of excellent, moderate, and poor opportunities, respectively. They felt that the percentage of big bucks in the harvest may not be representative of opportunity, per se, because some of their hunting districts produce low numbers of total deer harvested.

As can be seen from Figure 10, a substantial portion of Montana is currently providing moderate to excellent

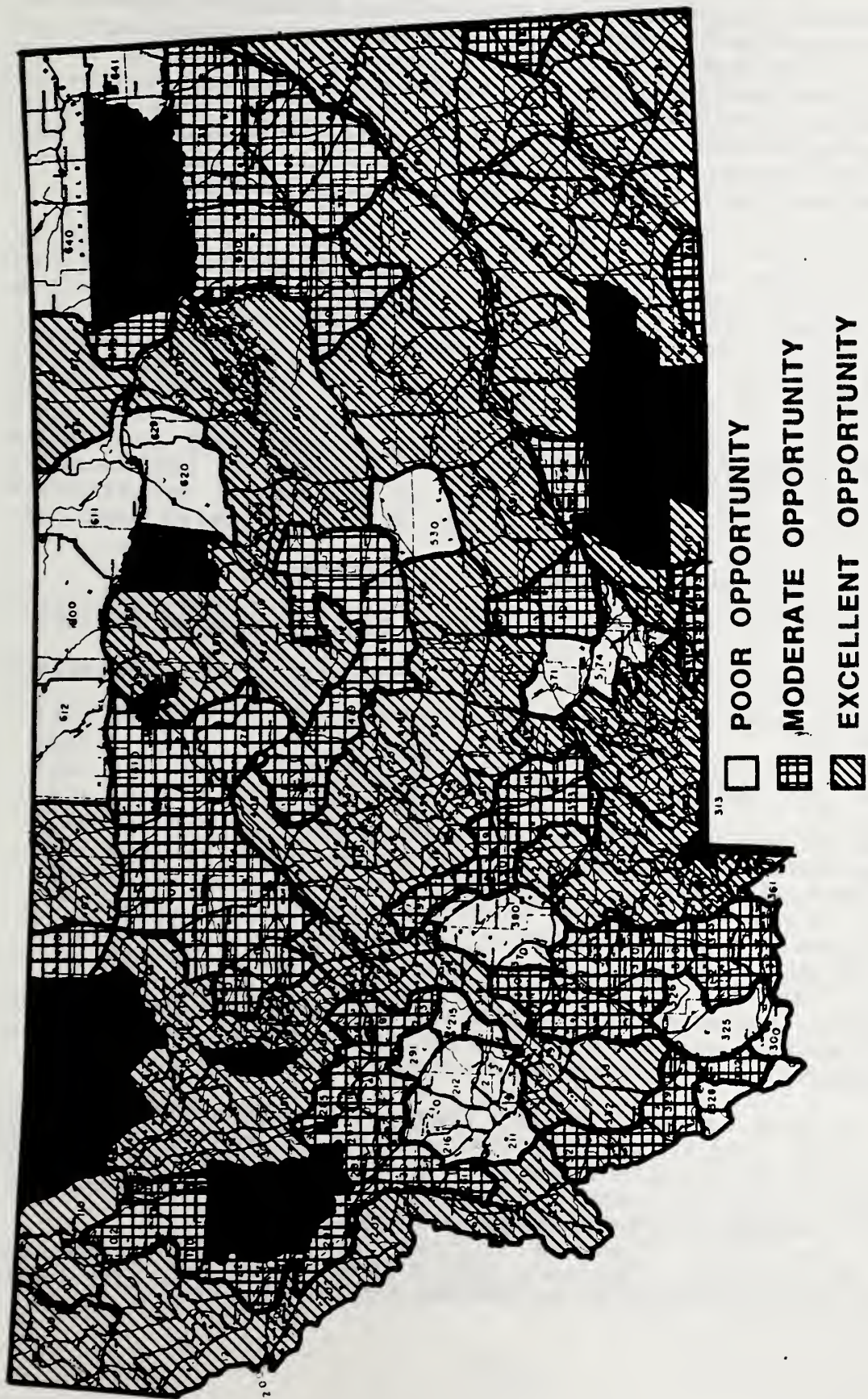


FIGURE 10. Buck Hunting Opportunities

opportunities of harvesting a big buck. Table 7 indicates that 124, or 61 percent, of all hunting districts statewide present excellent opportunity, with moderate opportunity in 58, or 28 percent, of hunting districts. Only 23, or 11 percent, of hunting districts have poor to no opportunity of harvesting a big buck. It must be noted that these figures are for mule deer, and some hunting districts such as 640 and 641 that do not support large populations of mule deer do provide excellent trophy white-tailed deer hunting.

These and other data indicate that Montana is generally in good shape with regard to current availability of big bucks. There are some problems in certain hunting districts (Fig. 10), and these should be addressed by further investigation to determine if the cause(s) relate to natural conditions or circumstances that could be affected by adjustment of management strategies. An example of the latter can be seen in Region 1 where cooperative road management programs are being developed with USFS to improve habitat security in logged areas. In contrast, there may be little that can be done in terms of management to eliminate the negative effects of the recent drought (lowered buck re-

Table 7. Opportunity to harvest a big buck by region.

	<u>Number of Hunting Districts (% of Region)</u>		
	Poor	Moderate	Excellent
Region 1	0 (0)	4 (29)	10 (71)
Region 2	8 (30)	11 (40)	8 (30)
Region 3	6 (15)	17 (44)	16 (41)
Region 4	0 (0)	10 (23)	33 (77)
Region 5	5 (18)	6 (21)	17 (61)
Region 6	4 (18)	4 (18)	14 (64)
Region 7	0 (0)	6 (19)	26 (81)
Statewide	23 (11)	58 (28)	124 (61)

cruitment rates, poor nutrition affecting antler development, etc.) on numbers of big bucks that will be available in eastern Montana in the near future.

It must be realized that there is no management strategy that will result in sufficient numbers of easily obtainable big bucks to satisfy everyone, everywhere, in Montana. At present, there are many de facto big buck hunting areas, but not in everyone's favorite hunting spot!

In general, a hunter's opportunity to see and/or harvest a big buck is directly related to the amount of effort he is

willing to expend--a serious trophy hunter expects to hunt fairly inaccessible terrain. There are numerous hunting districts in Montana that offer "backcountry" hunting opportunities, which are defined as areas at least 2 miles from an open road (Fig. 11). In fact, statewide there are 120, or 58 percent, of all hunting districts that offer at least some backcountry hunting opportunity (Table 8). All regions in the state have a surprisingly high proportion of hunting districts containing at least one backcountry area, varying from 79 percent in Region 3 to 50 percent in Region 5.

Table 8. Backcountry hunting opportunity by region. (Number of hunting districts having at least one area that is 2 miles from nearest open road).

	Number of Hunting Districts	Percent of Region
Region 1	10	71
Region 2	14	52
Region 3	31	79
Region 4	22	51
Region 5	14	50
Region 6	12	55
Region 7	17	53
	---	---
Statewide	120	58

BIG BUCK HARVEST STRATEGY

If low buck numbers in an area are due to factors that could be affected by manipulating harvest strategies, and if it is desirable to produce more big bucks in that area, then special regulations could be implemented which are designed to: 1) allow more bucks to reach older age classes, and/or 2) reduce hunter competition for big bucks. Each strategy will have positive and negative trade-offs which must be carefully examined before the strategy is implemented. The following is a list of harvest strategies designed to increase numbers of big bucks and the anticipated consequences of each.

A. Minimum Point Rule

Implications

1. Reduced hunter opportunity to harvest a buck.
2. Increased illegal mortality (sub-legal bucks left in field).
3. Directing pressure on big bucks may result in fewer

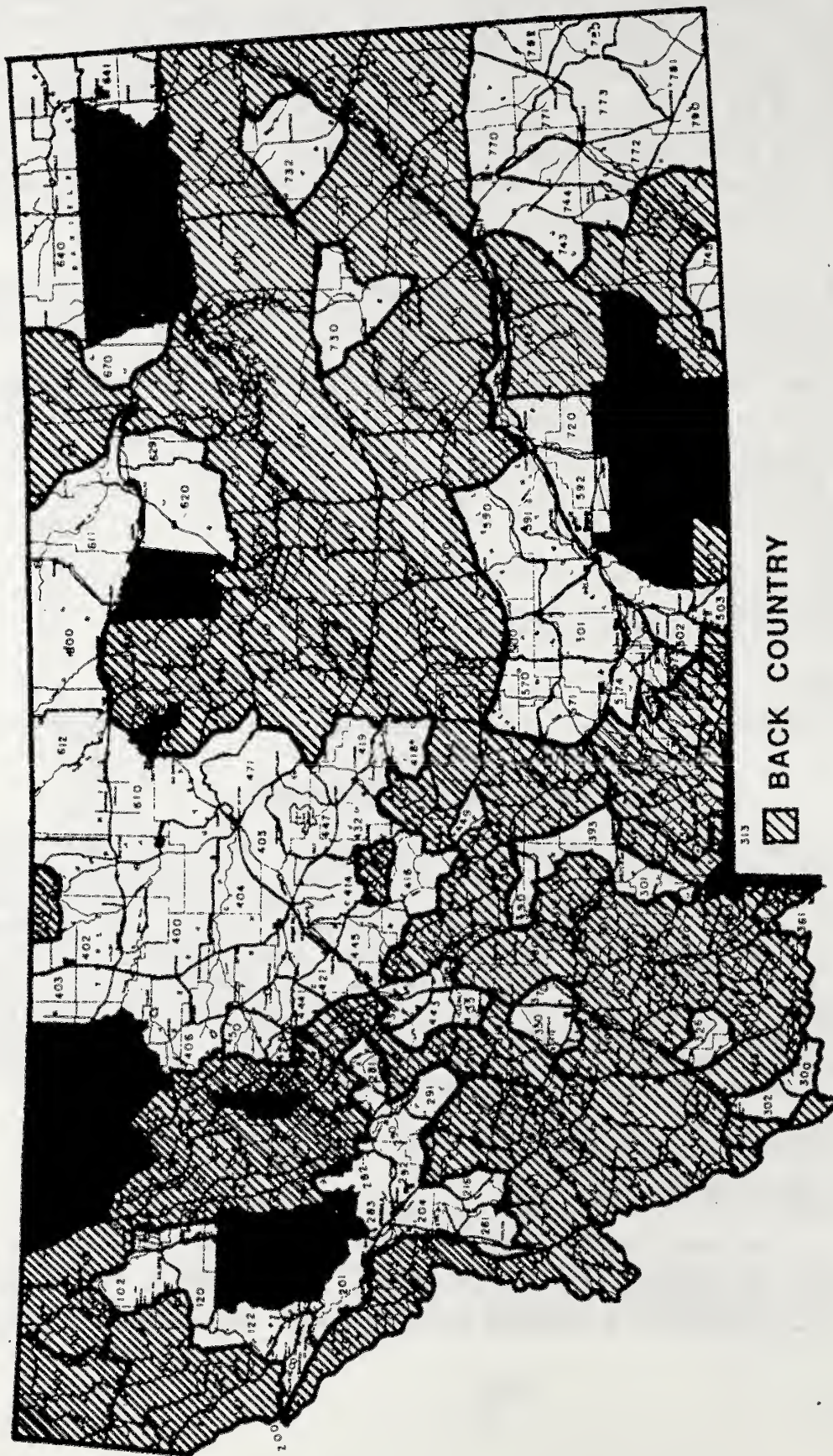


FIGURE 11. Hunting Districts with Back Country Hunting Areas

of them.

4. Postponing harvest will expose bucks to natural mortality, before they reach big buck size.

- B. Mandatory Waiting Period (after harvesting "big buck", hunter must wait period of years to hunt big bucks in trophy hunting districts).

Implications

1. May reduce hunter competition.
2. May increase survival of big bucks through hunting season.
3. Reduced hunter opportunity to hunt every year.
4. Increased record keeping.
5. Increased enforcement problems.
6. Mandatory check of all deer harvested.

- C. Stratified Seasons and Weapons Choice (Require hunter to choose weapon and/or season).

Implications

1. Spread hunting pressure throughout entire big game season.
2. May increase survival of big bucks through hunting season.
3. Decrease individual hunter's choice of weapon and length of hunting season.
4. Increased record keeping.
5. Pits weapons groups against each other for an optimum season time.
6. Landowners may not tolerate additional opening days.

- D. Alternate Year Species Hunting (Species tag)

Implications

1. May increase survival of bucks to older age classes in some cases.
2. Better control on species harvested.
3. Hunter does not have freedom to shoot either mule deer or white-tailed deer.
4. Increased illegal harvest.
5. Population "waves" of big bucks may not coincide with buck-hunting years.
6. Directing pressure on single species may result in fewer big bucks.

- E. Closed Season During Rut (shorter season and/or change season timing).

Implications

1. May allow more big bucks to survive hunting seasons depending on habitat utilization, but may reduce the probability to harvest them.
2. Reduce hunters opportunity (fewer days to hunt).
3. Increased hunter competition.

F. Quota Systems (season is closed when harvest quota of big bucks is reached).

Implications

1. Can control number of big bucks harvested and thus allow bucks to reach older age classes.
2. More biological information is collected since mandatory check of all deer harvested is required.
3. Reduced hunter opportunity (number of hunters).
4. Increase pressure early in season.
5. More intense population data is required to establish proper quotas.
6. Increased administrative effort (to publicize closures, etc.).

G. Limited Access Hunts (road closures, walk-in areas, etc.)

Implications

1. May allow more big bucks to survive hunting season.
2. Reduced hunting pressure/competition.
3. Provides diversity of hunting opportunities for some groups, while reduces hunting opportunity for others.
4. Inadequate antlerless harvest.
5. Increased hunting pressure/competition on other areas.

H. Limited Permits for Bucks

Implications

1. Allow more bucks to survive hunting season.
2. Reduced hunting pressure/competition.
3. Maximum control of numbers, sex, and age of deer harvested.
4. Reduced hunting opportunity (numbers of hunters).
5. More intense population data needed to establish proper quotas (requires more funding).
6. May increase hunting pressure on other areas.

General Recommendations

An effective public relations program could probably resolve many of the problems associated with the big buck availability issue. 1. The public should be well informed of how hunting pressure has changed through the years and about what is biologically possible and what is not. 2. They also may not be aware of the diversity of opportunity that exists in Montana at present. 3. The public should also be informed about the potential sacrifices that would have to be made in order to achieve the anticipated benefits of various hunting season options.

Where indications are that some change is necessary, it would be to our advantage to experiment with alternative harvest strategies on a limited scale. We should approach these strategies from a scientific standpoint and evaluate the results.

1. Efforts will be made to identify some specific hunting districts where there is a problem with low male:female ratios or there is a lack of a normal component of older males.
2. The available data will be reviewed to determine whether this phenomenon has always been the case or whether it is a recent development. This includes determining whether the problem is habitat related, hunting related, or the result of normal "waves" of recruitment.
3. Management options will be reviewed to experiment with an appropriate harvest strategy that may achieve the management objective of increasing big buck availability in these hunting districts.
4. These areas will be selected on the basis of sufficient data and a monitoring program would be mandatory to determine if the management action is achieving the desired result.
5. In addition to experimenting with problem areas, it would be appropriate to determine where the Big Buck Issue is coming from and whether it is really a well-founded concern. This could be determined from a carefully designed questionnaire. As custodians of an important public resource, we feel that this resource should be managed for the greatest public benefit.

A final consideration concerns the types of lands suitable for implementation of big buck management strategies. Most public lands should be available, but many private lands will not be because of landowner intolerance

for trophy hunters. Our experience is that many private landowners become very irritated at hunters who return weekend after weekend to hunt for "the big buck." It is doubtful if many landowners will be receptive to trophy management areas on their properties unless they are interested in selling hunting privileges. Any management strategies which might result in increased fee hunting on private lands in Montana should be carefully scrutinized before implementation.

This document summarizes data on current elk hunting opportunities and harvest trends of branch-antlered bulls with comparable data from the early 1960's to date. Trade-offs of various bull hunting regulations are also discussed. This information was compiled for the Montana Fish and Game Commission and sportsmen who are concerned about a possible lack of mature bull elk in Montana's elk populations. Since archery and late hunts have only become popular in recent years, they are not addressed in detail.

Comparison of Statewide Elk Hunting: 1963, 1971, 1984-85

The 1963 Elk Hunting Season (Fig. 1)

1. Distribution of Elk Hunting

- a. Elk hunting occurred in 65 elk hunting districts covering 22 million acres or 23% of Montana. (Areas open to elk hunting are termed hunted elk habitat.)

2. Season Length

- a. There was a 5-week general elk hunting season (Oct. 20 - Nov. 24).
- b. In addition, early either-sex seasons occurred in portions of Region 1, 2, and 3 (Bob Marshall area, Bitterroot area and Beartooth Mountains, covering almost 14% of hunted elk habitat) starting on Sept. 15. Portions of Region 2 (almost 12% of hunted elk habitat) also had a late branch-antlered bull season until December 22.
- c. Only 6 hunting districts were open to early archery elk hunting.

3. Season Types

- a. Over 66% of hunted elk habitat was open to either-sex hunting for 5 weeks.
- b. Twelve percent of hunted elk habitat was open to some either-sex hunting (1 day to 2 weeks). Approximately 21% of elk habitat was open to antlered bull hunting only (no antlerless permits). There was no elk hunting by permit only.

4. Hunter and Harvest Information

- a. Over 66,000 elk hunters harvested a little over 11,000 elk in 1963.

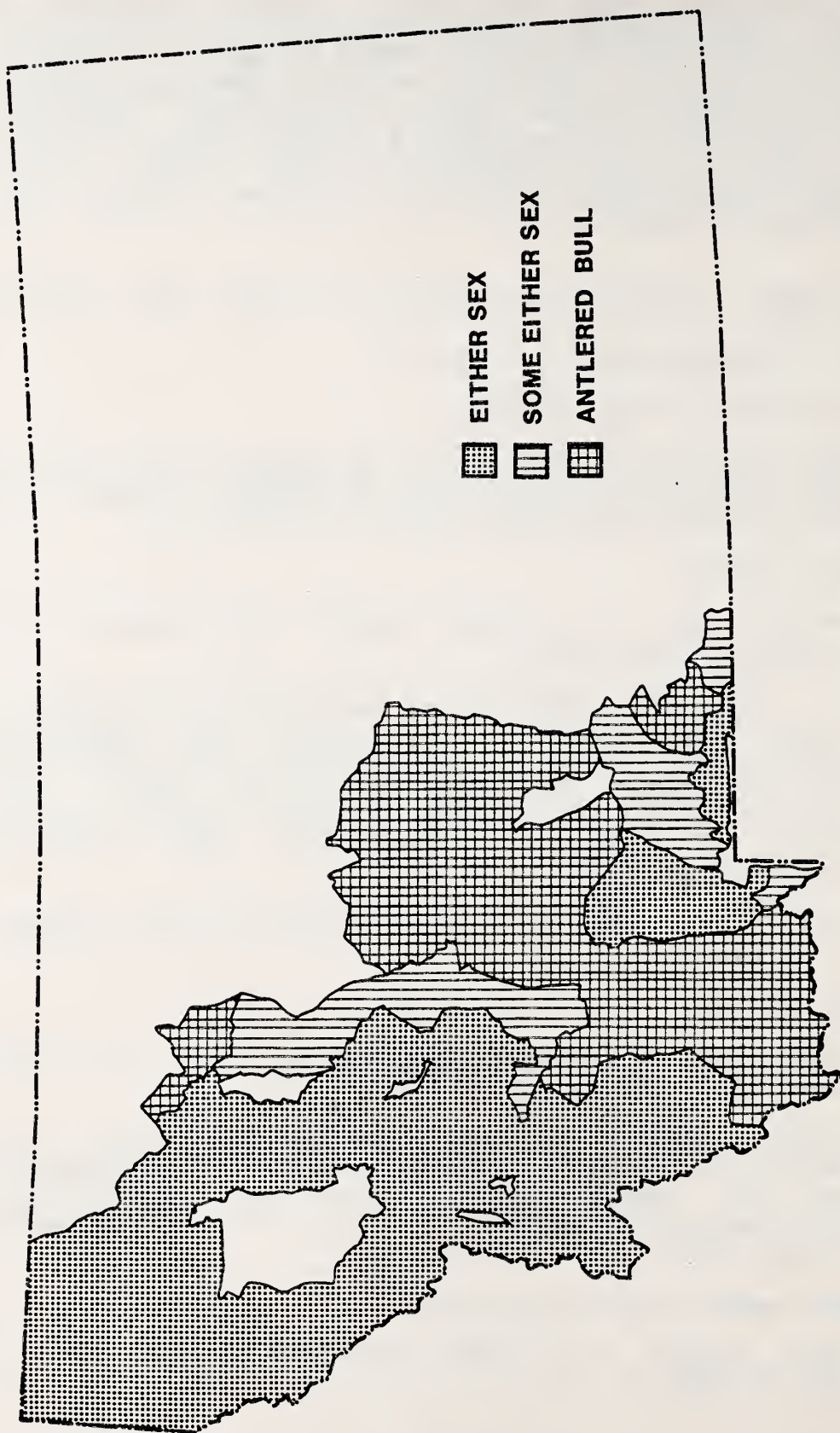


FIGURE 1. 1963 ELK HUNTING REGULATIONS DURING THE GENERAL RIFLE SEASON.

- b. Hunter density averaged 2 hunters per square mile and elk harvest was approximately 32 elk per 100 square miles of hunted elk habitat.
- c. Hunter success was 17% and the composition of the state-wide bull harvest was almost 85% branch-antlered bulls.

The 1971 Hunting Season (Fig. 2)

1. Distribution of Elk Hunting

- a. Elk were hunted in 89 elk hunting districts covering nearly 23 million acres or 24% of Montana.
- b. Nearly 1 million additional acres of Montana were open to elk hunting in 1971 compared to 1963.

2. Season Length

- a. There was a 6-week general elk hunting season (Oct. 17-Nov. 28).
- b. An early either-sex season started on Sept. 15 in portions of the Bob Marshall Wilderness and Beartooth Mountains.
- c. There was also an early bull elk season from Sept. 18-22, which was mostly west of the Continental Divide.
- d. Early archery-only hunting was allowed in over 50% of the elk hunting districts.

3. Season Types

- a. Season long either-sex hunting occurred in approximately 7% of hunted elk habitat in portions of Regions 3 and 4 (Scapegoat Wilderness). This compares to 67% in 1963.
- b. Some either-sex hunting (1 day to 2 weeks) occurred in 66% of hunted elk habitat compared to only 12% in 1963. Almost half (45%) of the areas open to antlered-bull hunting also had antlerless permits available. Permit-only elk hunting occurred in a little over 3% of the total hunted elk habitat.
- c. An early either-sex season occurred in approximately 5% of hunted elk habitat (in portions of the Bob Marshall area and the Beartooth Mountains).
- d. There also was an early bull elk season (Sept. 18-22 in over 50% of hunted elk habitat, which was mostly west of the Continental Divide.

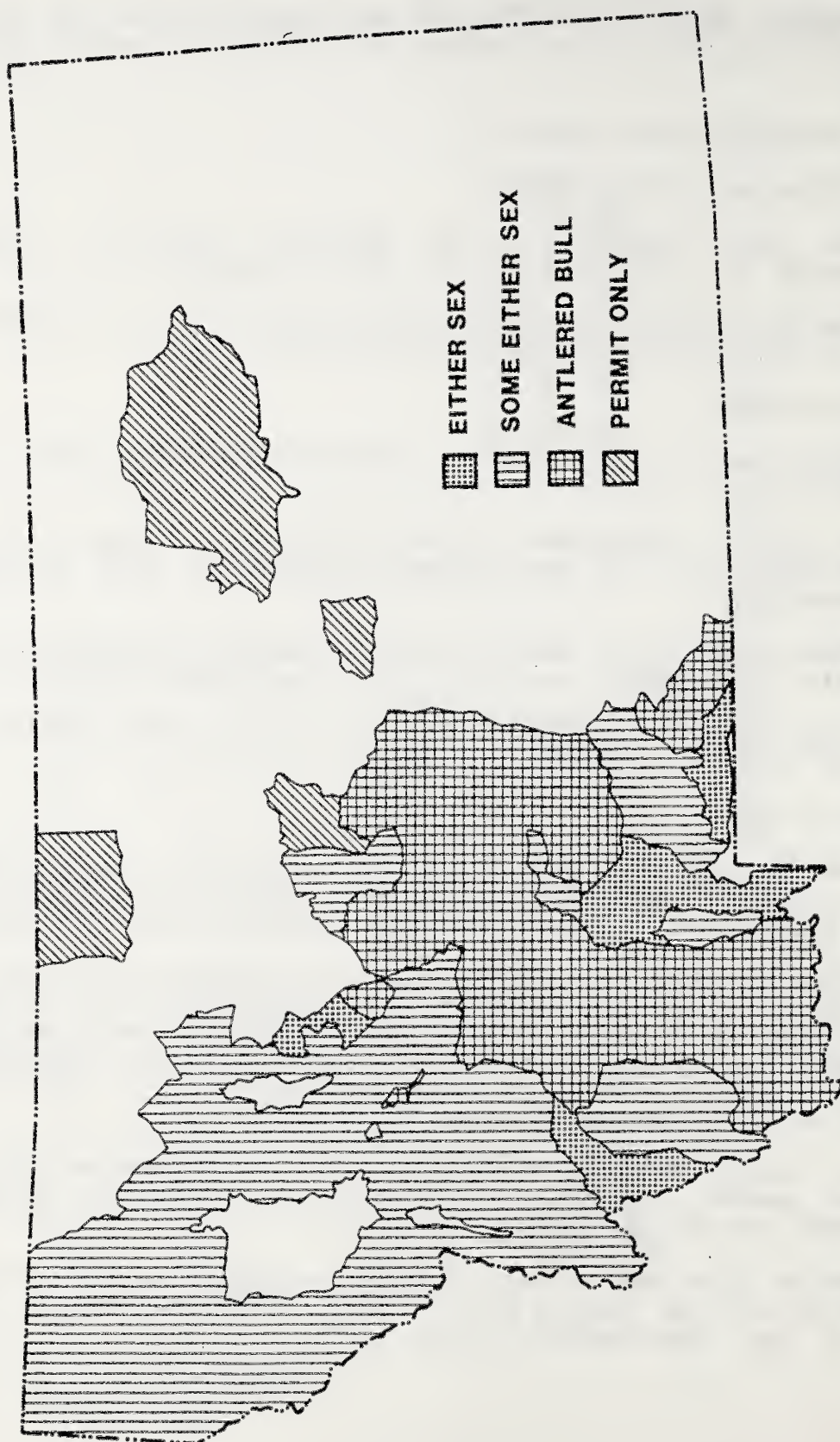


FIGURE 2. 1971 ELK HUNTING REGULATIONS DURING THE GENERAL RIFLE SEASON.

4. Hunter and Harvest Information

- a. Over 64,000 elk hunters harvested about 10,560 elk. Both the number of elk hunters and harvest were down slightly from 1963.
- b. During 1971 there were 2,208 archery elk hunters who harvested approximately 57 elk.
- c. Hunter density was slightly under 2 per square mile (1.8) and elk harvest averaged 18 elk per 100 square miles of hunted elk habitat.
- d. Hunter success was 16% and the percent branch-antlered bulls in the bull harvest was 62% compared with 85% in 1963.

1984-85 Hunting Season (Fig. 3)

1. Distribution of Elk Hunting

- a. Elk were hunted in 129 elk hunting districts covering a little over 23 million acres, or approximately 25% of Montana.
- b. Elk were hunted in over 1.5 million more acres in 1985 compared to 1963.

2. Season Length

- a. There was a 5-week general elk hunting season (Oct. 27 to Dec. 1).
- b. In addition, we had an early either-sex season starting on Sept. 15 in a portion of the Beartooth Mountains and an early antlered-bull season in the Bob Marshall Wilderness area.
- c. There were 14 hunting districts open to late season hunting by permit only. This compares to no late season permit-only hunting in 1963 and 2 hunting districts in 1971 which had late season permit-only hunting.
- d. Early archery hunting was allowed in 125 of the 129 elk hunting districts.

3. Season Types

- a. Only one hunting district (in the Scapegoat Wilderness) or 1% of hunted elk habitat in Montana had season-long either-sex elk hunting in 1985 compared to 67% and 7% in 1963 and 1971, respectively.

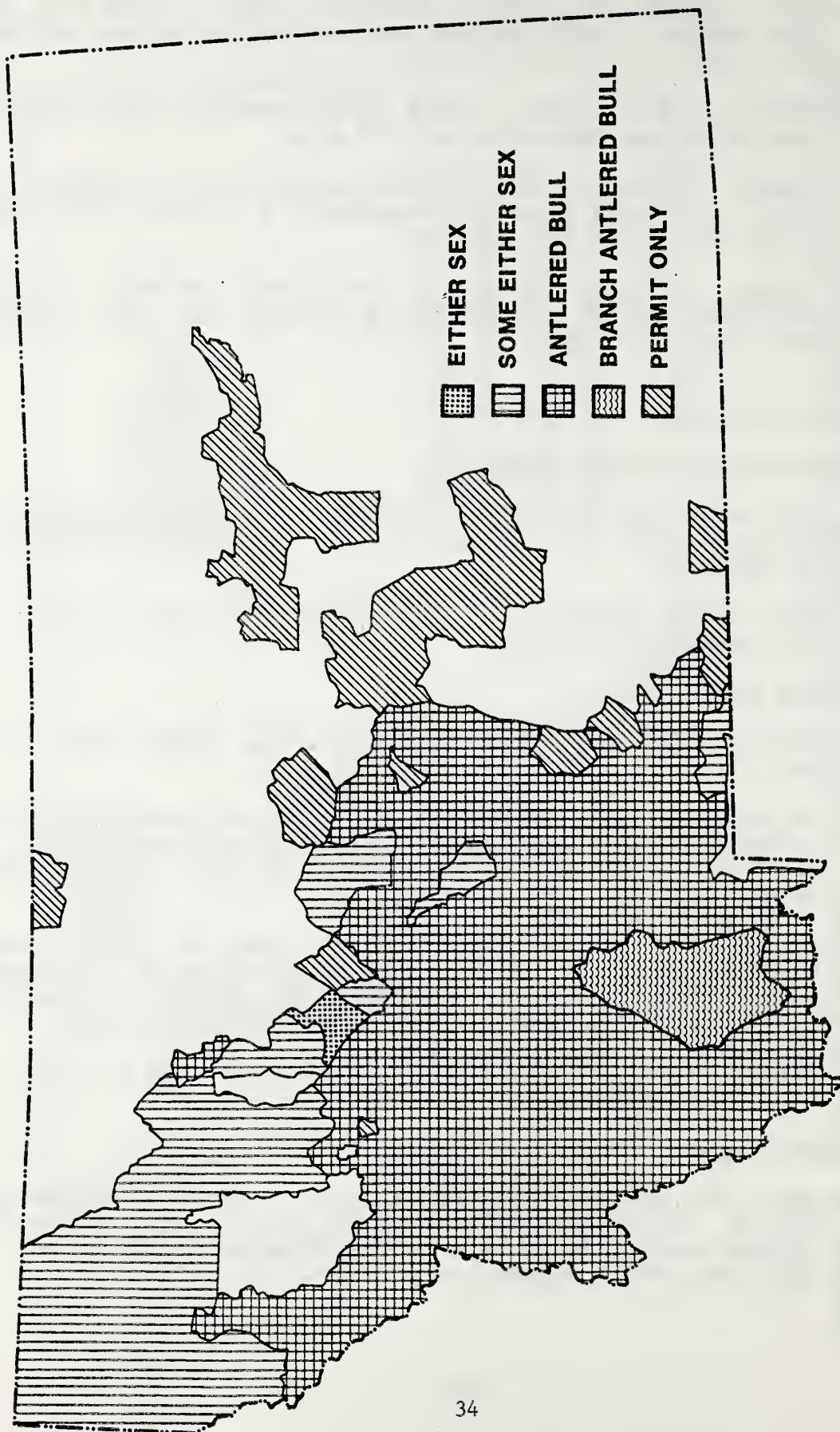


FIGURE 3. 1985 ELK HUNTING REGULATIONS DURING THE GENERAL RIFLE SEASON.

- b. Some either-sex hunting occurred in 32% of hunted elk habitat (portions of Regions 1, 3, and 4) and antlered-bull hunting (usually with antlerless permits) occurred in 57% of hunted elk habitat. Some either-sex hunting in 1963 occurred in 12% of hunted elk habitat. In 1971 this figure was 66%.
- c. Branch-antlered bull hunting occurred in 7 hunting districts in Region 3 amounting to over 3% of hunted elk habitat in the state. There were no branch-antlered bull regulations during the general rifle season in 1963 or 1971.
- d. Permit-only elk hunting occurred in 20 hunting districts in Regions 2, 4, 5, and 6, representing approximately 6% of the hunted elk habitat in the state. There was no elk hunting by permit only in 1963; in 1971, 3% of hunted elk habitat had permit-only elk hunting.
- e. In addition, there was archery-only elk hunting in a small portion of Region 2; hunting with archery or shotgun only in a portion of Region 1; and archery by permit only occurred in 3 hunting districts in Region 6.

4. Hunter and Harvest Information

- a. There were about 86,000 elk hunters in 1984; they harvested over 18,000 elk. This is an increase of 30% in the number of elk hunters and an increase of 67% in the elk harvest compared to 1963.
- b. In addition there were over 11,000 archery elk hunters in 1984 who harvested 783 elk including 532 bulls.
- c. Hunter density was 2.4 hunters per square mile and elk harvest averaged more than 50 elk per 100 square miles of hunted elk habitat.
- d. Hunter success was a little over 21% with branch-antlered bulls comprising 42% of the bull harvest, compared with 62% in 1971 and 85% in 1963.

Summary

1. Distribution of Elk Hunting (Table 1, Figs. 1-3)

- The number of acres where we can hunt elk is higher now than in the past. The number of acres of hunted elk habitat has increased by approximately 7% since 1963 when we hunted elk in 23% of Montana compared to 25% today.

2. Season Length (Table 2)

Table 1. Summary of 1963, 1971 and 1985 elk hunting season types.

	1963	1971	1985
Percent of Montana's hunted elk habitat in various seasons:			
Season-long either-sex	67	7	1
Some either-sex	12	66	32
Antlered-bull	21	24	58
Permit-only	0	3	6
Branch-antlered bull	0	0	3
Percent of Montana's hunted elk habitat having:			
Early either-sex season	14	5	1
Early antlered-bull seasons	0	54	4
Late branch-antlered bull seasons	11	0	0
Number hunting districts opened to late season permit-only hunting:	0	2	14
Percent of hunting districts open to early archery hunting:	10	52	97

Table 2. Summary of 1963, 1971, and 1985 elk hunting season length and general distribution of elk hunting.

	1963	1971	1985
General season length:	5 weeks	6 weeks	5 weeks
Number hunting districts:	65	89	129
Acres in Montana where you could hunt elk (termed hunted elk habitat) (million acres):	21.8	22.7	23.3
Percent of Montana which was hunted elk habitat:	23	24	25

- Today we continue to enjoy a 5-week general elk hunting season, similar in time to 1963 (October and November) and 1971 (6 weeks in 1971).
- However, in 1985 approximately 5% of Montana's hunted elk habitat is open to early elk hunting compared to approximately 60% in 1971 and 14% in 1963.
- A late branch-antlered bull season in the Bitterroot area occurred in 1963; in 1971, 2 hunting districts were open to late season elk hunting by permit only hunting compared to 14 hunting districts in 1985.

- Early archery hunting occurred in less than 1% of the elk hunting districts in 1963 compared to 97% of the hunting districts today.

SYNOPSIS

 *
 * Since 1963, we have maintained the 5-week general *
 * season, significantly reduced the early rifle *
 * season and increased late season elk hunting. *
 * Early archery elk hunting has dramatically *
 * increased. *
 *

3. Season Types (Table 1, Figs. 1-4)

- Either-sex elk hunting during the entire general hunting season has been reduced from 67% of hunted elk habitat in 1963 to 7% in 1971, and less than 1% in 1985.
- In 1963 almost 80% of hunted elk habitat was open to at least some either-sex elk hunting. This compares to approximately 73% in 1971, and 33% in 1984-85.
- Today, antlered-bull hunting occurs in over 60% of hunted elk habitat compared to 20% in 1963 and almost 25% in 1971.
- Permit-only elk hunting did not occur in 1963, occurred in slightly over 3% of hunted elk habitat in 1971, and represents almost 16% of hunted elk habitat today.

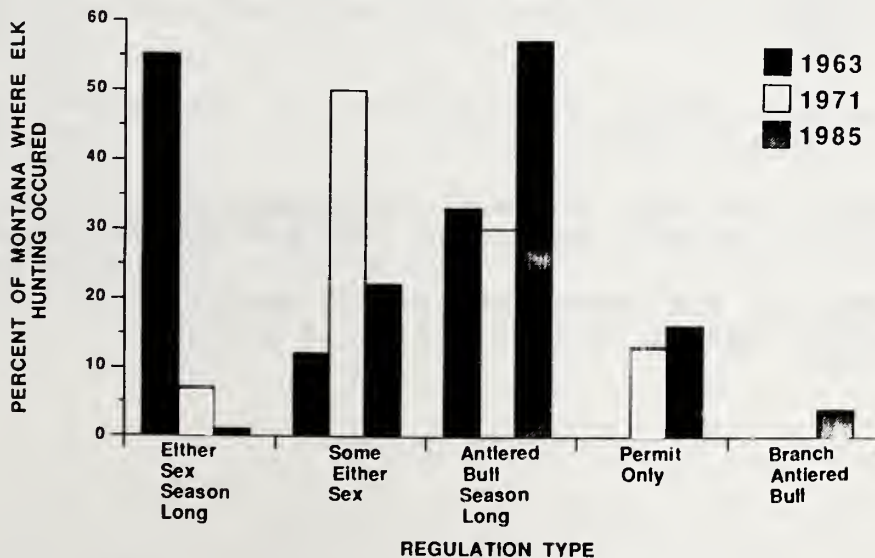


Figure 4. A comparison of five basic elk hunting regulation types in Montana between 1963, 1971, and 1985.

SYNOPSIS

*
* Since 1963 there has been a significant reduction *
* of either-sex elk hunting during the general *
* rifle season with a substantial increase of *
* antlered-bull hunting and permit-only hunting. In *
* addition, there are now 7 hunting districts with *
* branch-antlered bull hunting; 2 archery-only *
* hunting districts; an archery and shotgun-only *
* hunting district and 3 archery by permit-only *
* hunting districts. *
*

4. Hunter and Harvest Information (Tables 3 and 4)
(The trend in hunter and harvest statistics are better illustrated by averaging several years instead of looking at individual years. An individual year's statistics may reflect weather conditions or license cost changes that influence hunter numbers or harvest during that year. Averages were computed using data in Table 3.)
- Comparing information from the 1960's (1960-69) with that from 1980-1984 indicates a 44% increase in the average number of elk hunters per year (63,096 to 91,041) and a 25% increase in the elk harvest (12,370 compared to 15,482).
 - Further comparison of elk harvest figures between these 2 periods indicates that in the 1960's an average of 72% of the bulls in the bull harvest were branch-antlered compared to only 47% in the 1980's. However, the average number of branch-antlered bulls in the yearly harvest increased 9% between the 1960's and 1980's (from 4,649 to 5,064).
 - Hunter success averaged 20% in the 1960's compared to 17% in the 1980's.
 - Number of elk hunters per square mile of hunted elk habitat amounted to 2.0 in 1963 and 2.4 in 1984.
 - Number of elk harvested per 100 square miles of hunted elk habitat was 32 in 1963 and 51 in 1984.

Table 3. Trend in statewide elk harvest and hunter numbers, 1953-1984.

Year	Hunters	B.A. Bulls ²	Spike Bulls ²	Cows ²	Calves ²	Percent Success	Total Harvest ¹
1984	86,443	4,944	6,718	5,845	959	21	18,478
1983	99,198	5,157	5,374	5,395	1,242	17	17,122
1982	89,653	5,311	4,939	3,205	404	16	13,912
1981	90,087	4,699	4,595	3,152	485	14	13,055
1980	89,822	5,208	5,126	3,390	814	17	14,841
1979	98,516	3,665	3,881	2,951	824	12	11,556
1978	86,636	3,980	4,033	2,751	698	14	11,879
1977	79,628	5,227	3,738	2,863	723	17	13,342
1976	74,190	2,717	2,384	1,938	502	11	7,860
1975	91,956	4,487	3,465	4,222	1,398	17	15,750
1974	88,155	3,620	2,556	2,595	704	12	10,577
1973	78,653	4,855	3,442	4,676	1,603	19	15,243
1972	66,626	3,448	1,884	2,920	863	14	9,411
1971	64,218	4,058	2,531	2,794	828	16	10,559
1970	77,819	5,315	2,970	4,555	1,103	18	13,988
1969	73,848	4,682	2,233	3,910	1,095	16	12,082
1968	79,623	6,168	2,572	5,785	2,040	21	16,712
1967	71,883	5,514	2,621	5,253	1,658	21	15,190
1966	55,113	4,731	1,732	4,459	1,419	23	12,450
1965	42,350	2,980	934	2,666	1,018	18	7,657
1964	56,904	4,109	1,767	3,973	1,276	20	11,247
1963	66,410	5,171	925	3,576	1,251	17	11,032
1962	67,043	3,838	1,557	4,795	1,541	18	11,731
1961	61,470					25	15,500
1960	56,320					18	10,100
1959	63,180					22	13,900
1958	53,040					23	12,200
1957	55,650					23	12,800
1956	50,870					23	11,700
1955	55,380					29	16,000
1954	51,540					26	13,400
1953	55,000					24	13,200

¹Includes unclassified elk.

²Data not collected prior to 1962

Table 4. Summary of 1963, 1971 and 1985 elk hunter and harvest statistics.

Hunter and harvest information	1963	1971	1984
Number elk hunters	66,410	64,218	86,443
Number of elk hunters per square mile	2.0	1.8	2.4
Hunter success (%)	16.7	16.4	21.4
Elk harvest	11,032	10,559	18,478
Percent cows and calves	44	36	37
Percent bulls	56	65	64
Of bull harvest-% branch-antlered bulls	85	62	42
Number of branch-antlered bulls harvested	5,171	4,058	4,944
Percent spikes	15	38	58
Number of spike bulls harvested	925	2,531	6,718
Number of elk harvested per 100 square miles	32	30	51
Number of archery elk hunters	1,021 ¹	2,208	11,053
Number of elk harvested by archery hunters	34 ¹	57	783

¹Reliable data only available as early as 1968.

SYNOPSIS

*
 * Comparing statewide elk hunter survey results from *
 * the 1960's to the 1980's indicates a 44% increase *
 * in the number of elk hunters and a 25% increase in *
 * the elk harvest. However, the percent branch- *
 * antlered bulls has dropped from 72% of the total *
 * bull harvest to 47%, while the total number of *
 * branch-antlered bulls harvested was 9% greater in *
 * the 1980's, and hunter success declined from 20% in *
 * the 1960's to 17% in the 1980's. The number of *
 * archery elk hunters and number of elk harvested by *
 * archery hunters have increased dramatically since *
 * the 1960's. *

Comparison of Regional Trends

The following information is in part summarized in Tables 5 and 6.

Region 1

- a. Region 1 (29% of hunted elk habitat in Montana) has maintained more either-sex hunting of elk than any other Region in Montana. In 1985, Region 1 still maintained over 90% of their elk habitat in limited (8 day) either-sex seasons.
- b. The density of elk hunters and elk harvest per unit area has been generally lower in Region 1 than the remainder of the state.
- c. In 1984, Region 1 had approximately one-half the density of hunters, and approximately one-third the density of elk harvested per unit area compared to statewide figures.
- d. The percent of branch-antlered bulls in the bull harvest is typically highest in Region 1 compared to the rest of Montana. It declined by 40% between 1963 and 1984.
- e. From 1963-1984, Region 1 has had decreasing trends in the density of hunters (-8%), elk harvest per unit area (-30%) and hunter success (-15%).

Region 2

- a. This Region (23% of hunted elk habitat in Montana) supported at least some either-sex seasons in over 95% of their hunted elk habitat in 1963 and 1971. Today, however, the entire Region is antlered-bull hunting (with antlerless permits) except for 3 hunting districts which are permit-only or archery-only.
- b. From 1963 to 1984, there was a 26% increase in the density of elk hunters, a 9% increase in elk harvest per unit area, and a 15% decrease in hunter success.
- c. Percent branch-antlered bulls in the harvest is typically second highest in Region 2 compared to the rest of the state, although it declined by 44% between 1963 and 1984.

Region 3

- a. Region 3 (27% of hunted elk habitat in Montana) supported at least some either-sex elk hunting in over 50% of hunted elk habitat in 1963 compared to 3.8% of the Region today.

Table 5. Percent of hunted elk habitat in each Fish and Game Region with various season types in 1963, 1971, and 1985.

	REGIONAL TOTALS						
Type of Season	1	2	3	4	5	6	State Total
Season-long either-sex							
1963	100	95.5	40.2	0	0	0	67.1
1971	0	0	24.6	2.4	0	0	7.2
1985	0	0	0	6.9	0	0	0.9
Some either-sex							
1963	0	2.5	16.5	44.9	48.4	0	12.1
1971	100	96.4	27.1	34.7	28.8	0	65.9
1985	92.7	0	3.8	28.1	0	0	31.9
Antlered-bull							
1963	0	0	43.3	55.1	51.6	0	20.8
1971	0	3.6	48.3	55.6	71.2	0	23.7
1985	7.3	99.7	83.9	48.5	66.7	0	57.9
Branch-antlered Bull							
1963	0	0	0	0	0	0	0
1971	0	0	0	0	0	0	0
1985	0	0	12.3	0	0	0	3.4
Permit-only							
1963	0	0	0	0	0	0	0
1971	0	0	0	7.3	0	100	3.2
1985	0	0.3	0	16.5	33.3	100	5.9

- b. In 1984, Region 3, together with Region 4, maintained the highest density of both hunters and elk harvested per unit area.
- c. Region 3 had the second lowest percentage of branch-antlered bulls in the harvest in 1984, a 56% decrease since 1963.
- d. From 1963 to 1984, Region 3 has shown large increases in the density of elk hunters per unit area (62%), elk harvest per unit area (over 2 times), and hunter success (44%).

Table 6. Elk hunter and harvest information for each Region in 1963, 1971, and 1984.

	REGIONAL TOTALS						Total
	1	2	3	4	5	6	
Number of Elk Hunters per sq. mile							
1963	1.3	2.3	2.1	2.5	2.1	-	2.0
1971	1.3	2.4	2.2	2.9	2.7	.45	1.8
1984	1.2	2.9	3.4	3.3	1.8	.26	2.4
Elk harvested per 100 sq. miles							
1963	27	45	34	21	10	-	32
1971	20	41	33	32	20	2	30
1984	19	49	78	78	31	20	51
Percent hunter success							
1963	20	20	16	9	5	40	16.6
1971	15	17	15	11	7	5	16.4
1984	17	17	23	23	17	77	21.4
Percent branch-antlered bulls in bull harvest							
1963	88	79	85	93	100	-	84.8
1971	76	71	51	52	64	100	61.6
1984	53	44	39	43	42	34	42.4

Region 4

- Region 4 (14% of hunted elk habitat in Montana) supported at least some either-sex elk hunting in approximately 45% of hunted elk habitat in 1963 compared to approximately 35% of the Region today.
- Permit-only elk hunting did not occur in 1963; represented 7.3% of the Region's hunted elk habitat in 1971; and 16.5% in 1985.
- Similar to Region 3, Region 4 currently experiences the highest density of elk hunters and elk harvest in the state.

- d. Although Region 4 had a higher percentage (43% versus 39%) of branch-antlered bulls in the harvest compared to Region 3 in 1984, they experienced a similar decline (54%) since 1963.
- e. From 1963 to 1984, similar again to Region 3, Region 4 has shown increases in the density of elk hunters (32%) per unit area, elk harvest per unit area (over 3 times) and hunter success (over 2 times).

Region 5

- a. Region 5 (4% of hunted elk habitat in Montana) had some either-sex elk hunting in approximately 50% of its hunted elk habitat in 1963 compared to approximately 30% in 1971 and none in 1985.
- b. In 1985, one third of Region 5 was permit only elk hunting.
- c. Since 1963, the amount of Region 5 opened to elk hunting has increased by over 30%.
- d. The percent of branch-antlered bulls in the total bull harvest for this Region has decreased from 100% in 1963 to 42% in 1984.
- e. From 1963 to 1984, the density of elk hunters went down 14% (2.1 to 1.8) while the elk harvest per unit area and hunter success went up over 3 times (.10 to .31 and 5 to 17, respectively).

Region 6

- a. Elk hunting in Region 6 (2% of hunted elk habitat in Montana) has been by permit only (1971 and 1984-85 information).
- b. A special archery season was held in Region 6 in the vicinity of the Bearpaw Mountains in 1963. In 1971 and 1985, elk hunting in Region 6 was limited to the Missouri River Breaks area.

Statewide Trends in Elk Harvests and Hunter Numbers, 1953-1984

Annual statewide elk harvests have ranged from 7,657 to 18,478 and averaged 12,952 over the last 32 years. Hunter numbers have increased gradually resulting in a general decline in percent success (Table 3 and Fig. 5).

Compared to previous 5-year periods, the average annual harvest of both branch-antlered and spike bulls (and therefore

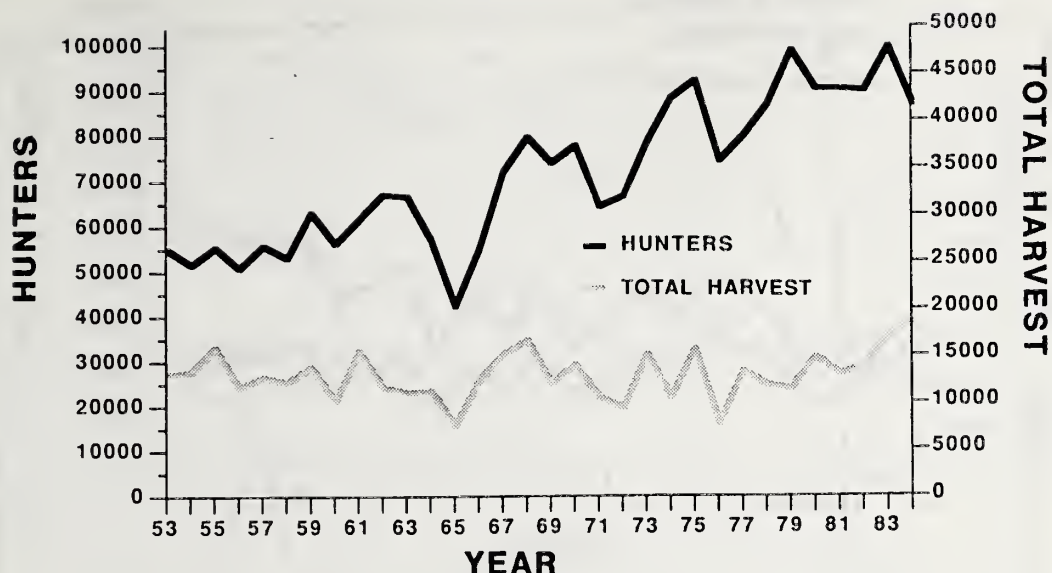


Figure 5. Trend in Statewide Elk Harvest and Hunter Numbers.

all bulls), was higher in the 1980-84 period than at any time since 1962, the first year sex and age breakdowns were recorded (Table 3). In fact, the average annual bull harvest during 1980-84 (10,414) nearly equalled the total average annual elk harvest during 1962-64 (11,337). The combined bull harvest in 1984 was greater than the total elk harvest in 10 of the preceding 31 years.

The average cow harvest in 1980-84 was similar to that in the 1960's, and higher than during the 1970's. A gradual decline in the average annual harvest of calves has occurred since the mid-1960's. This decline totaled 46% between 1965-69 and 1980-84. Declining calf harvests coincide with a major shift from either sex hunting to antlerless permit regulations. The combination of more calves being produced as a result of higher elk populations and fewer calves being harvested has partially resulted in the increase in both availability and harvest of spike bulls. The proportion of bulls in the average annual harvest has increased from about one-half in 1962-64 to two-thirds during the 1980-84 period.

Comparison of Branch-Antlered vs. Total Bull Harvests, 1962-1984

There has been a strong trend for proportionately fewer branch-antlered bulls in the statewide antlered elk harvest from 1962-1984. In 1962-64 76% of the antlered-bull harvest was branch-antlered, while in 1980-84 it was 49% (Fig. 6).

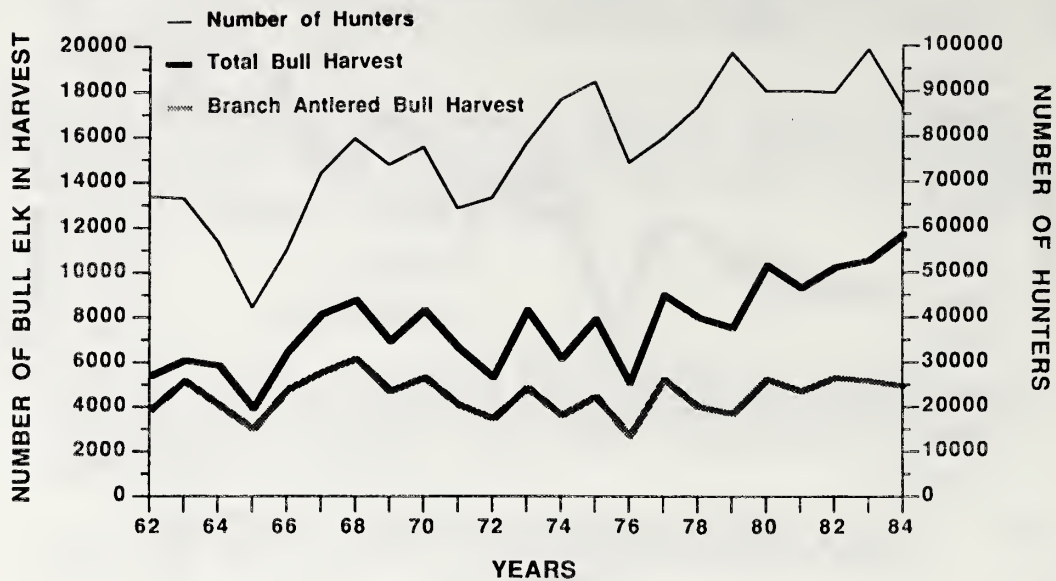
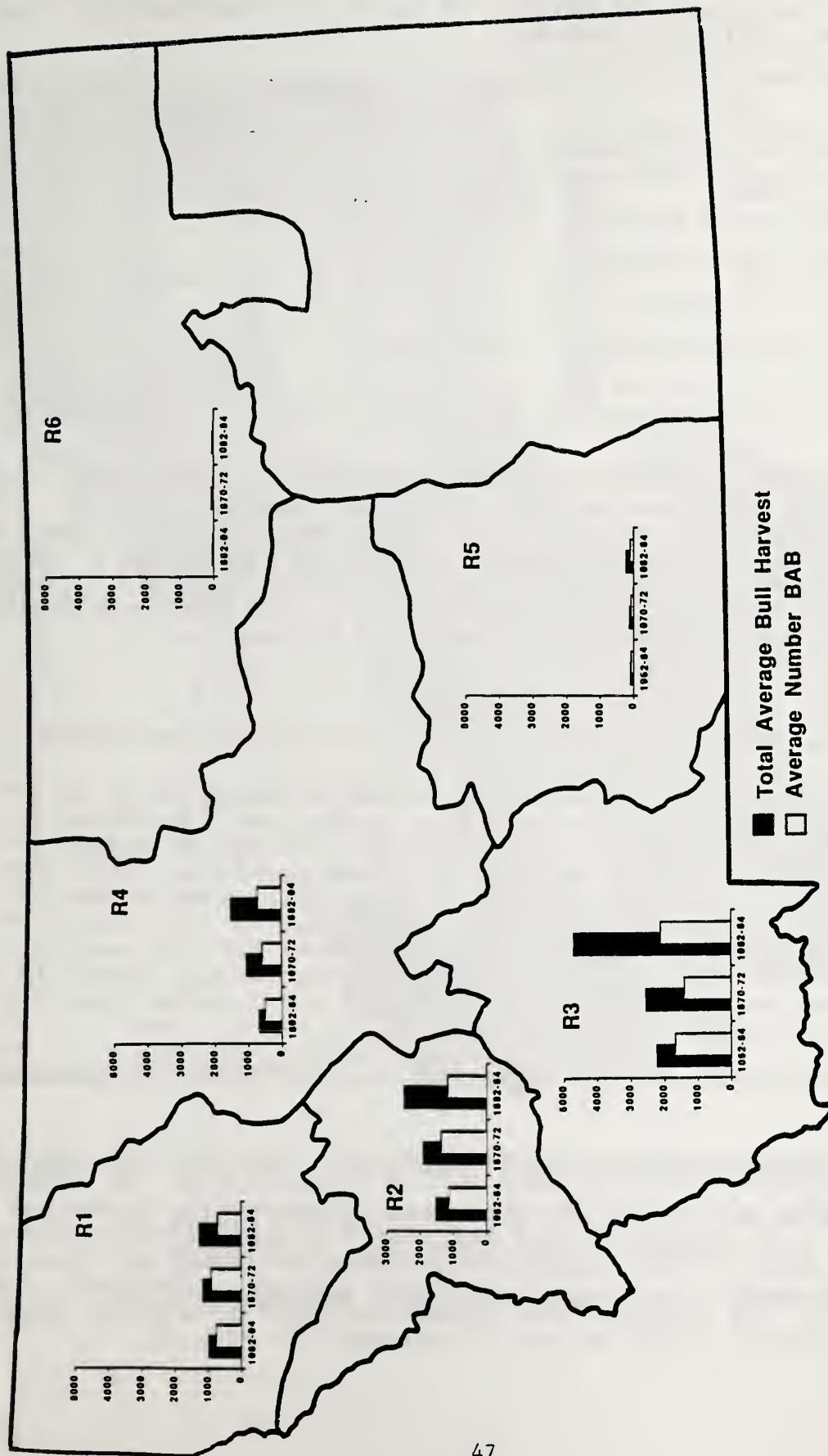


Figure 6. Comparison of branch antlered bull harvest to total bull harvest and hunters from 1962 through 1984.

Average annual branch-antlered bull harvest was compared to average annual total bull harvest for three time periods; 1962-64, 1970-72, and 1982-1984 by Region. These time periods are respectively referred to as periods 1, 2, and 3. The following trends are illustrated in Fig. 7 and Table 7.

1. In every region total average bull harvest increased between period 1 and period 2. Every region except Region 6 showed a further increase between period 2 and period 3. In Region 6, the total average bull harvest declined between period 2 and period 3, to a level similar to period 1.
2. In Regions 1 and 2, the average annual branch-antlered harvest was about the same in periods 1 and 3 and greater in period 2. Region 3 had somewhat fewer branch-antlered bulls taken in period 2 than in period 1, and the most in period 3.
3. Regions 4 and 5 showed a steady increase in the average number of branch-antlered bulls taken through the three periods.
4. In Region 6, about the same number of branch-antlered bulls were killed in periods 1 and 3, with less taken in period 2.

No region showed a steady decrease in the number of branch-antlered bulls taken through the 3 periods. In the 2 districts



**FIGURE 7. AVERAGE BULL ELK HARVESTS BY REGION FOR THREE TIME PERIODS :
1962-64, 1970-72, 1982-84.**

Table 7. Trend in average number of branch-antlered bulls harvested per year and percent of total bull harvest by region for 1962-64, 1970-72, 1982-84.

	Regions					
	1	2	3	4	5	6
1962-64						
Number of BAB	760	1145	1679	504	69	35
Percent	78	75	75	76	68	78
1970-72						
Number of BAB	888	1371	1403	569	84	28
Percent	77	72	55	55	65	41
1982-84						
Number	711	1183	2097	706	108	37
Percent	56	48	45	47	49	80

that had fewer branch-antlered bulls taken in period 3, the number taken in the third period was about the same as in the first period. The percentage of the total bull harvest that was branch-antlered bulls was about stable in the first 2 periods and decreased in the third period in Regions 1, 2 and 5, decreased constantly in Regions 3, and 4, and was about the same in periods 1 and 3 and less in period 2 for Region 6.

SYNOPSIS

 *
 * Although the percentage of branch-antlered bulls in *
 * the total bull harvest was stable or decreased *
 * from 1962-1964 through 1982-1984, except in Region *
 * 6, the average number of branch-antlered bulls *
 * taken in all regions in the early 1980's was *
 * either about the same or greater than in the early *
 * 1960's. In comparing branch-antlered bull harvests *
 * between the early 1980's and the early 1970's *
 * fewer were harvested in Regions 1 and 2 while more *
 * were harvested in Regions 3, 4, 5, and 6. *
 *

Spike and Branch-Antlered Bull Harvests, 1970-1972 vs. 1982-1984

Numbers of spike and branch-antlered bulls harvested in 1970-1972 and 1982-1984 were compared for each hunting district with a general elk season. Districts or groups of districts in which spike and branch-antlered harvests remained stable (less than 10% change) and where harvest of either segment changed greater than 10% are illustrated in Fig. 8.

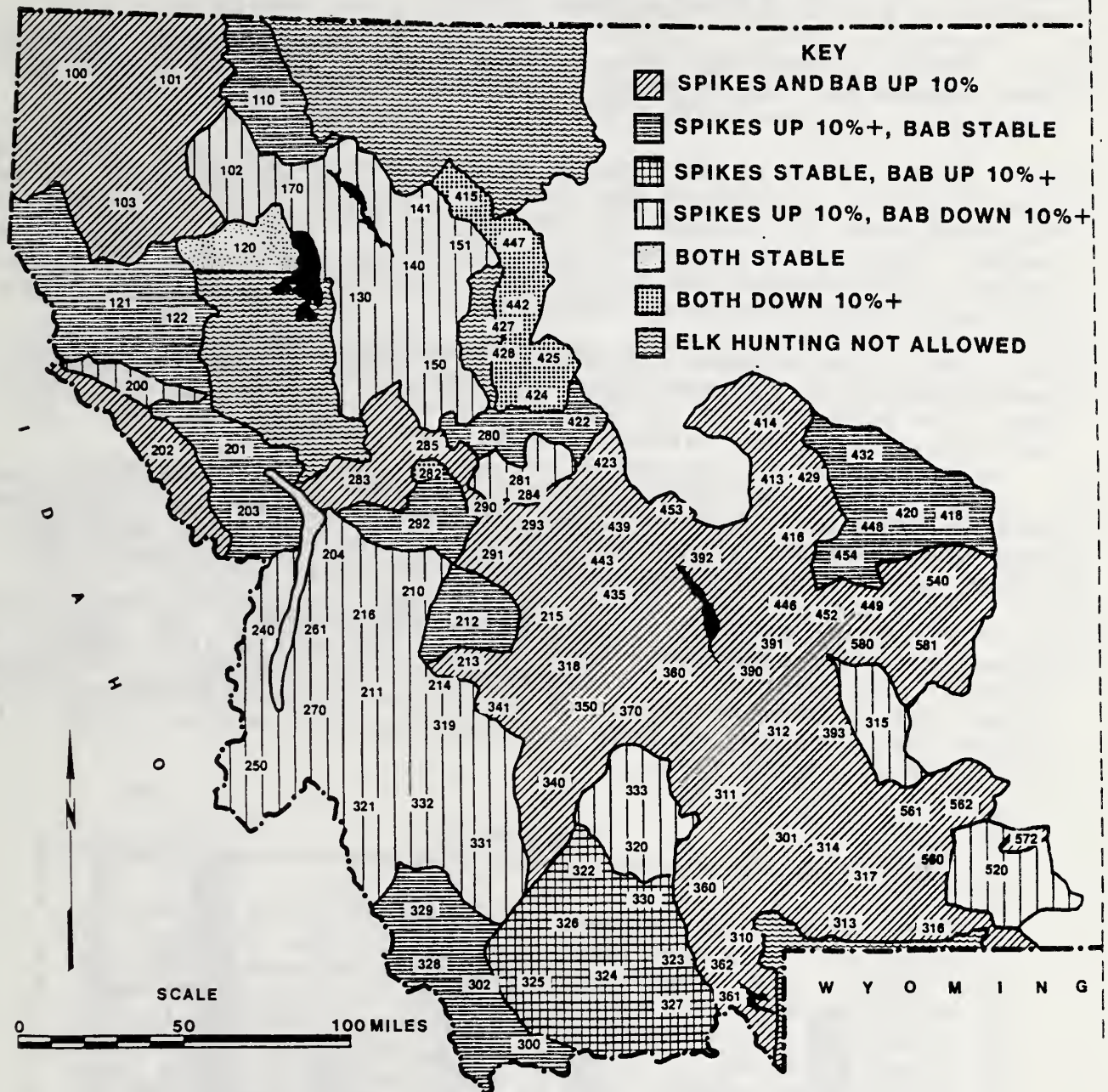


FIGURE 8. CHANGE IN SPIKE AND BRANCH-ANTLERED BULL HARVEST : 1970-72 TO 1982-84 FOR THE GENERAL RIFLE SEASON (PERMIT ONLY AREAS EXCLUDED). NUMBERS REPRESENT HUNTING DISTRICTS

Districts in which both spike and branch-antlered harvests declined at least 10% occupied 3% of the area in Montana open to general elk hunting. These districts are almost exclusively along the east front of the Rockies between Glacier National Park and the Dearborn River.

Hunting District 120, northwest of Flathead Lake, was the only district in the state in which the harvest of both bull segments was essentially stable.

Districts in which spike harvest was up at least 10% and branch antlered harvest was down at least 10% occurred in 27% of the area open to general elk hunting. Though these districts are found throughout hunted elk habitat, the majority lie along the Continental Divide and include the upper Flathead, the Bitterroot, the upper Clark Fork, and the Big Hole drainages.

An area between the upper Beaverhead and Madison Rivers, occupying 6% of the area open to general elk hunting in Montana, was the only area in the state in which spike harvest was stable and branch-antlered harvest was up more than 10%.

Districts in which spike harvest was up at least 10% and branch-antlered harvest was stable occupied 18% of the Montana general elk hunting area. These districts were scattered across the state and showed no particular pattern.

Finally, districts in which both segments of the bull harvest were up at least 10% made up 45% of the area open to general elk hunting. These areas stretch across the state from the northwest corner of Region One diagonally through the south half of Region Four and north half of Region Three to portions of Region Five.

SYNOPSIS

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*****
*
* In comparing Montana hunting districts open to
* general elk hunting, a change in the numbers of
* spike and branch-antlered bulls harvested during
* the period 1970-72 vs. 1982-84 is evident. Harvest
* of spikes increased in 90%, remained stable in 7%,
* and declined in only 3% of the area open to general
* elk hunting. Harvest of branch-antlered bulls in-
* creased in 57%, was stable in 19%, and declined in
* 30% of the area open to general elk hunting.
*
*****
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Age Structure and Antler Point Class Data from Long Term Check Stations

Although the total branch-antlered bull harvest in the state is up, a larger proportion of younger bulls are taken now compared with the 1960's and early 1970's. Little information is available on the trend in age structure and antler point class of bull elk harvested with the exception of areas checked by long term check stations.

The following data depict trends in age structure of bulls checked through stations at Darby (upper Bitterroot- H.D.'s 250 and 270), Bonner (Plackfoot- H.D.'s 280, 281, 282, 283, 285, and 292), Augusta (Sun River- H.D.'s 424, 425, 427, 428, and 442) and the Gallatin (Gallatin and Madison- H.D.'s 301, 310, 311, 360, 361, and 362). While identical information has not been collected at each check station, thus precluding comparisons between check stations, data from each accurately reflect trends in age structure and antler point class of bulls harvested in specific areas.

Darby. At the Darby Check Station there has been an apparent decline in the number and percent of 6-point or greater bulls checked (approximately 30% between 1968-71 and 1980-84), with little change in numbers or percent from the early 1970's through 1984 (Fig. 9). However, there has been an increase during the last 5-year period; this corresponds to a change in season type started in 1981 from either-sex hunting (until a quota of cows was checked) to bulls-only with permits for antlerless elk.

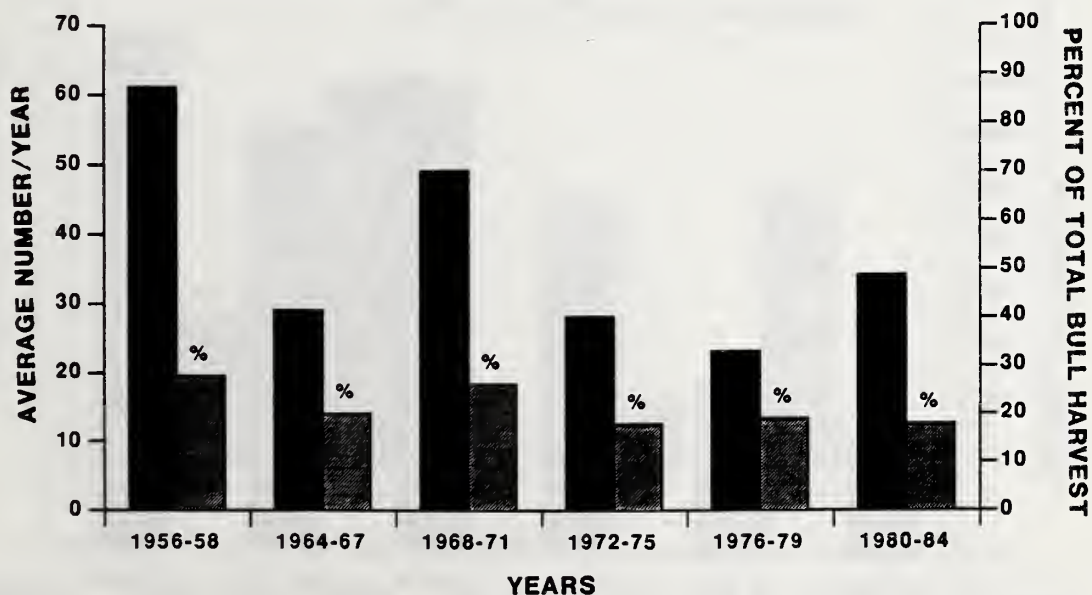


Figure 9. Darby Check Station - Trend in number of 6 pt. or greater bulls checked.

In terms of age structure, there has been a slight decrease (11%) in the number of 3 1/2-year and older bulls harvested since the late 1960's (Fig. 10). The proportion of these bulls in the total bull harvest has remained relatively stable.

The trend in the number of hunters checked per 3 1/2-year or older bull harvested was investigated at Darby. During the late 1960's, 41 hunters per year were checked per 3 1/2-year or older bull harvested. This has increased to 168 hunters per year per 3 1/2-year or older bull during 1982-84 (Fig. 11).

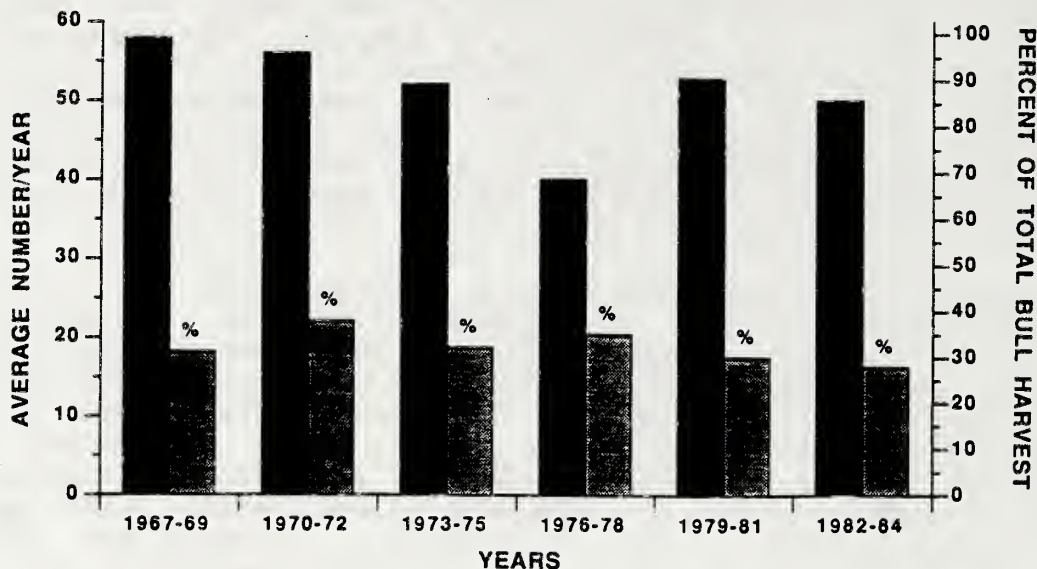


Figure 10. Average number of 3 1/2 year plus bull elk harvested from the Upper Bitterroot and checked through Darby.

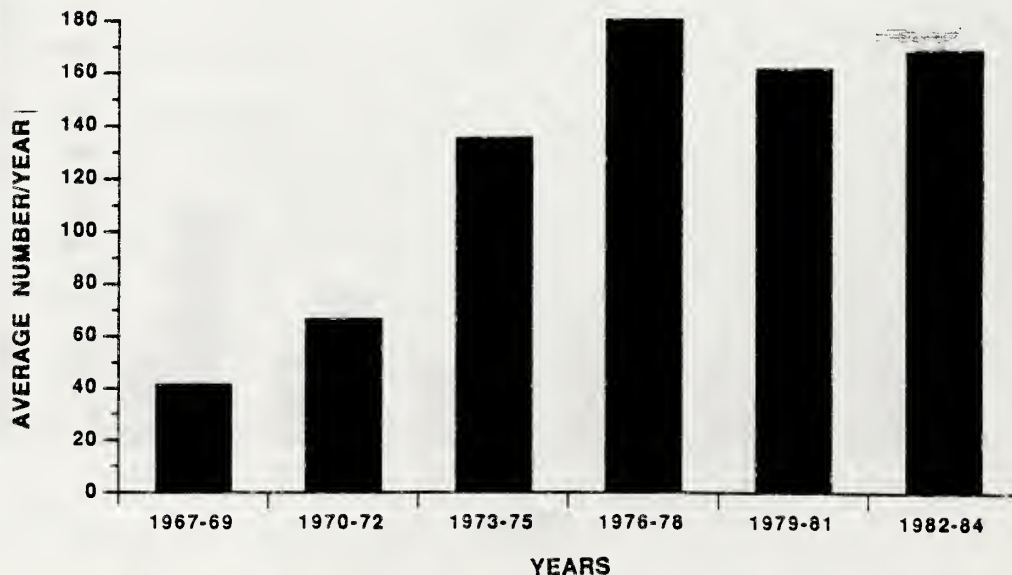


Figure 11. Trend in number of hunters per 3 1/2 year plus bull checked at Darby.

Bonner. Data from this station indicates a general decline of about 50% in 6-point bulls through the 1970's compared with the late 1960's (Fig. 12). The average number of 6-point or better bulls increased during the 1980-84 period. However, the proportion of these bulls in the total bull harvest remains below that of the late 1960's.

The average number of 3 1/2-year plus bulls checked through Bonner declined through the mid-1970's, but has since increased to levels similar to the late 1960's (Fig. 13). However, the percent of 3 1/2-year or older bulls in the total bull harvest has continued to drop and has declined 53% since the late 1960's.

The trend in the number of hunters checked per 3 1/2-year or older bull harvested at Bonner has increased considerably since the late 1960's. During 1967-69, there was an average of 63 hunters per year per 3 1/2-year or older bull harvested (Fig. 14). This increased to 367 hunters per year per 3 1/2-year plus bull harvested during 1982-84. As with Darby, there has been little change in the number of 3 1/2-year or older bulls checked.

There has been little change in the number of 3 1/2-year and older bulls harvested and checked through the Darby and Bonner Check Stations. However, the large increase in hunters has resulted in an increased demand for a limited resource and the perception by hunters that fewer branch-antlered bulls are present.

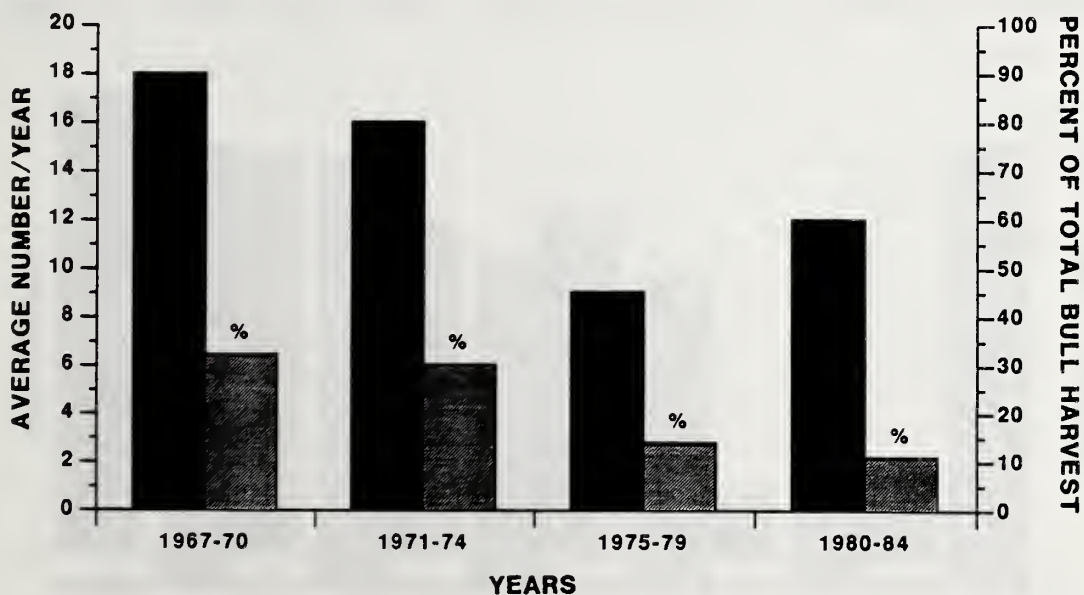


Figure 12. Bonner Check Station - Trend in number of 6 pt. or greater bulls checked.

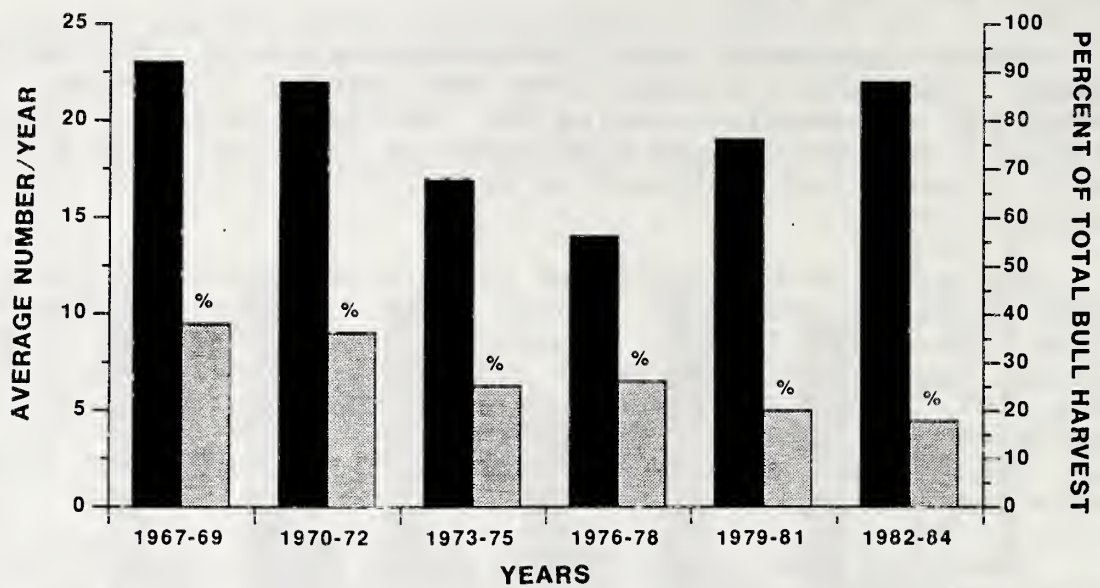


Figure 13. Average number of 3 1/2 year plus bull elk harvested from the Blackfoot and checked through Bonner.

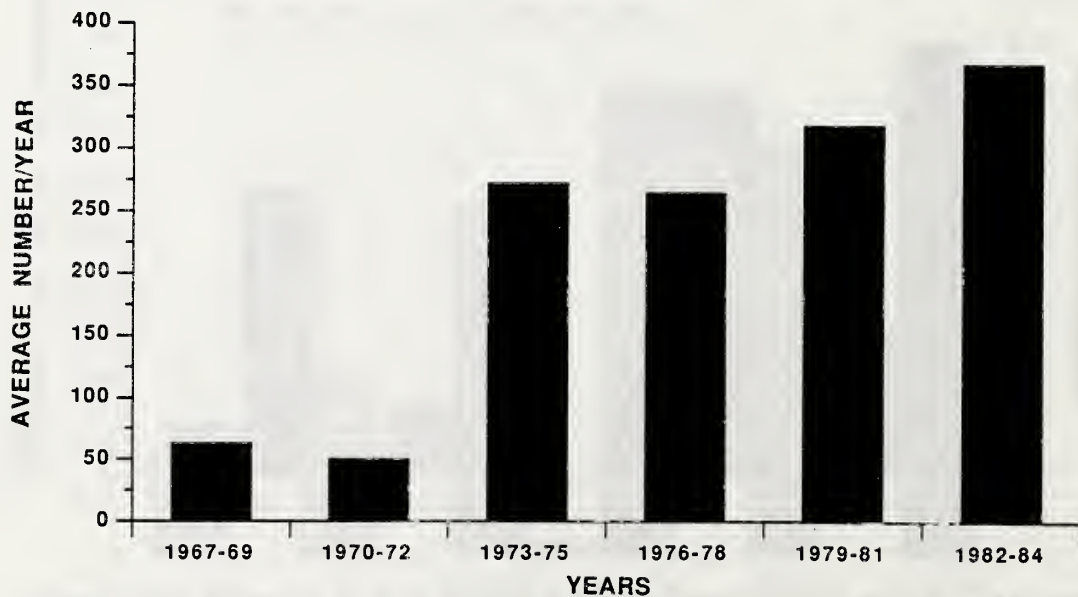


Figure 14. Trend in number of hunters per 3 1/2 year plus bull checked at Bonner.

Augusta. Data from this check station on antler-point classification dates back to 1972. The number of 6-point or greater bulls checked/year decreased by 17% from this date to 1984, while the proportion of bulls in this category has been about 20% throughout this time (Fig. 15).

The trend in the average age of bulls checked at Augusta declined somewhat in the mid-1970's, but increased again in the early 1980's to levels equal to the late 1960's (Fig. 16).

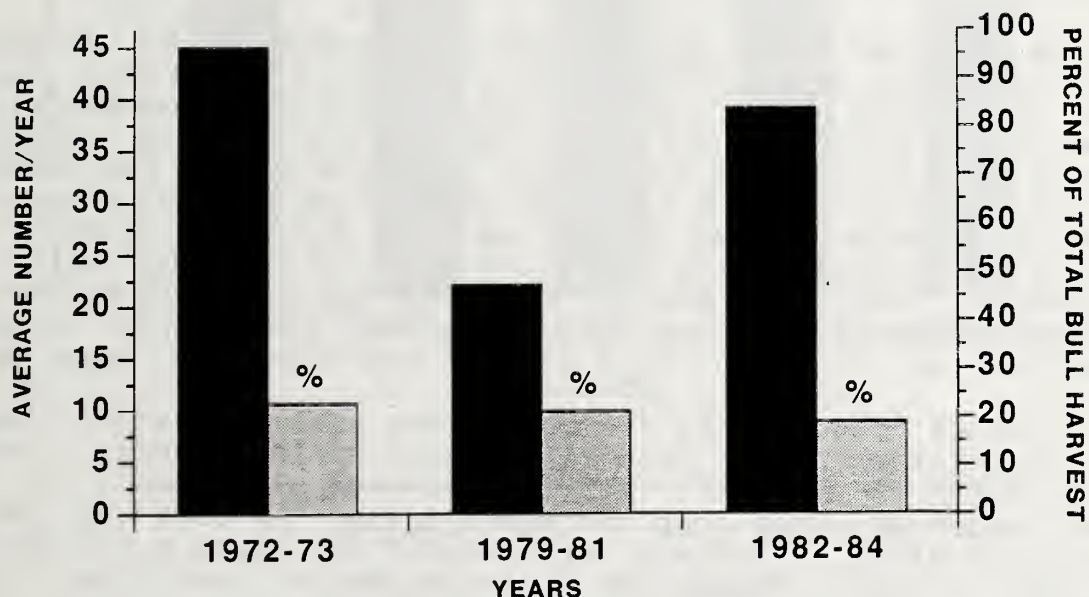


Figure 15. Augusta Check Station - Trend in number of 6 pt. or greater bulls checked.

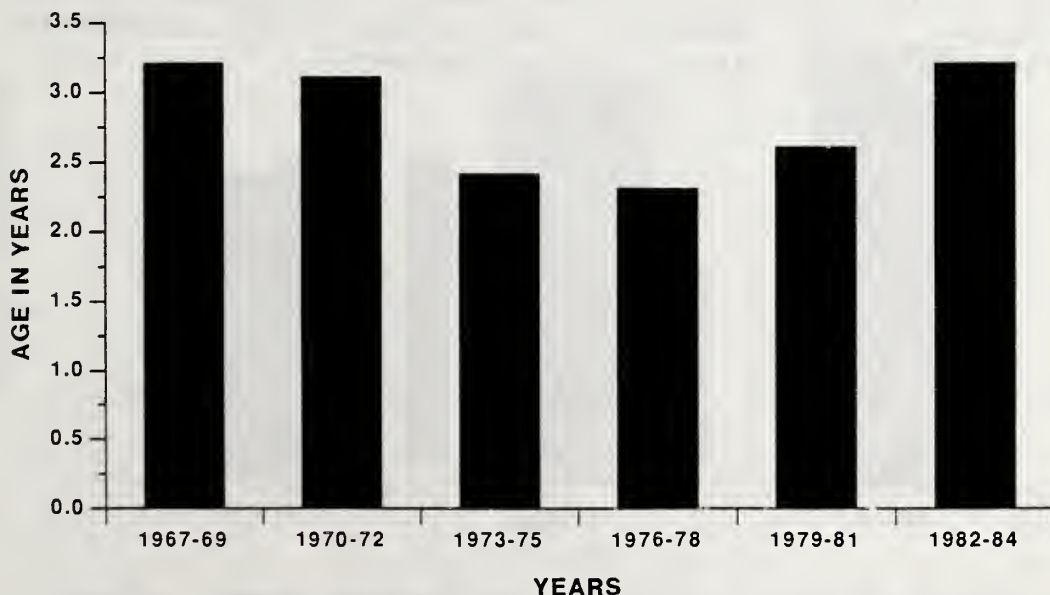


Figure 16. Trend in the average age of bull elk checked through the Augusta check station.

Gallatin. Data from the Gallatin Check Station were analyzed for trends in the number and percent of 3 1/2-year or older bulls in the total bull harvest from individual hunting districts in the Gallatin Canyon. The percent of branch-antlered bulls in the harvest exhibits a declining trend in all cases. The percent of 3 1/2-year and older bulls in the checked harvest has declined from 70% in the early 1970's to 38% during 1982-1984. The number of bulls in this age category has fluctuated, although a recent increase is apparent (Fig. 17). This increased bull harvest, while a reflection of increasing elk numbers, has not equalled a predicted increase, as exhibited by other segments of the population.

The average age of antlered elk checked shows a steady decline from the early 1970's (4.7 years) to 1980-84 (3.1 years) (Fig. 18). Compared to other areas, this lower average age in recent years still exemplifies the ability of the Gallatin-Madison area to produce older age class bulls in the harvest. This is largely due to the high degree of habitat security relative to other areas of the state. Data are lacking to address the status of the availability of 6-point bulls in the harvest. But, average age structure of the bull segment of the harvest substantiates that these bulls comprise a lower proportion of the total bull harvest now than in past years.

Although fluctuating due to factors such as weather dependent migrations of elk from Yellowstone National Park, hunter effort expended to kill a 3 1/2-year or older bull in the Gallatin-Madison area has increased during the last 15 years. During 1982-1984, 53 hunters were checked for every 3 1/2-year or older bull killed. Comparable data from the mid and late 1970's showed 37 and 49 hunters checked per 3 1/2-year or older bull killed (Fig. 19). Hunter numbers through the Gallatin Check Station have shown a slow but steady increase, having doubled during the last 10 years. These data, like those from the Darby and Ronner Check Stations substantiate the perception by hunters that fewer large bulls are present.

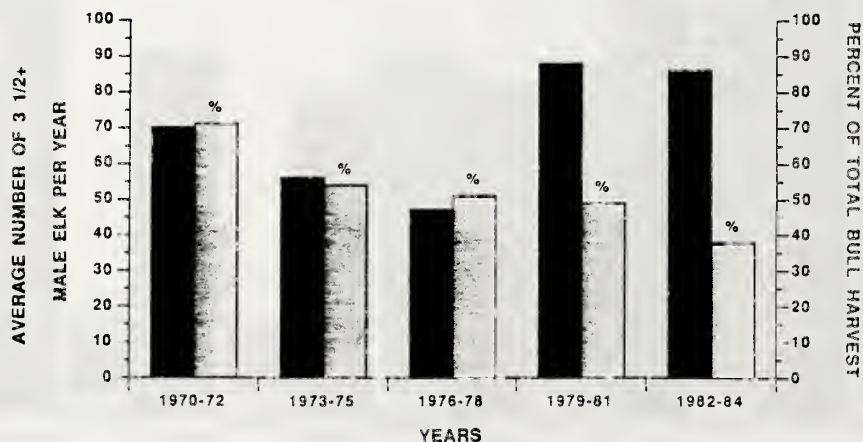


Figure 17. Average number of 3 1/2+ bull elk killed as checked from the Gallatin/Madison area by the Gallatin Game Check Station (H.D.'s 301, 310, 311, 360, 361, 362).

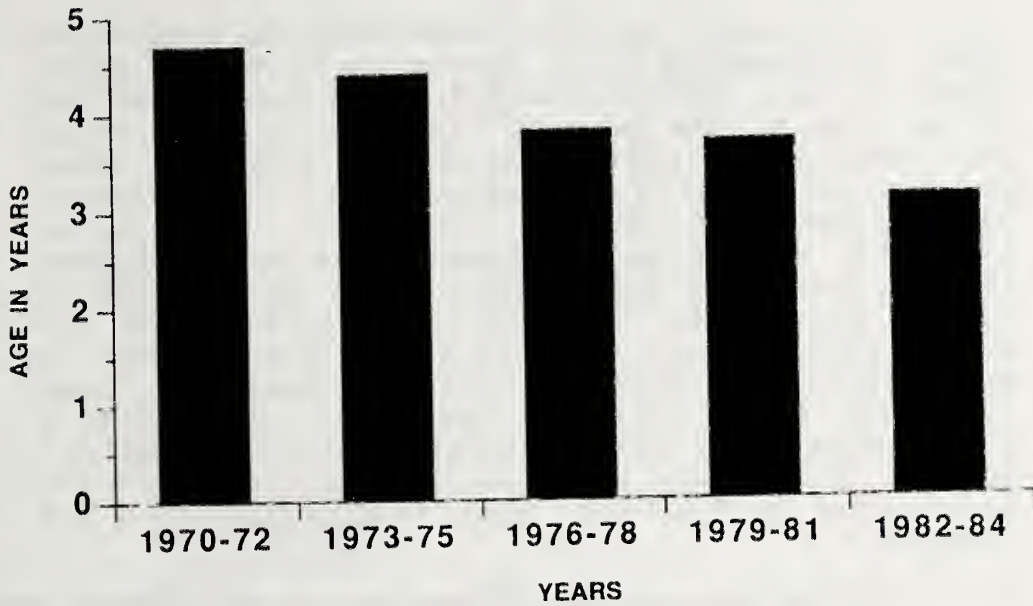


Figure 18. Average age of antlered elk killed in the Gallatin/Madison and checked through the Gallatin Game Check Station (H.D.'s 301, 310, 311, 360, 361, 362)

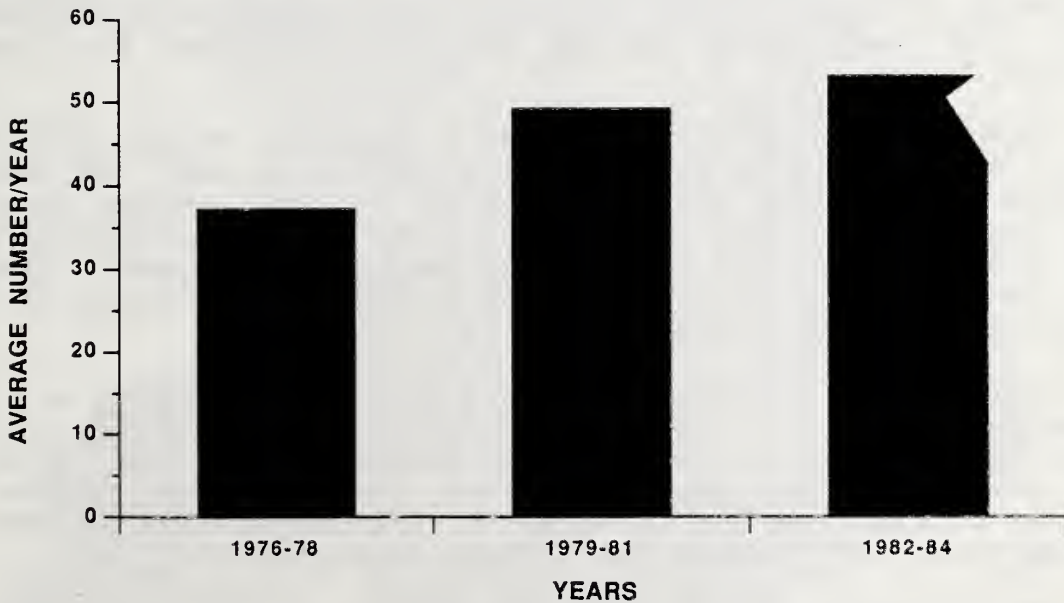


Figure 19. Trend in number of hunters per 3 1/2 year plus bull checked at the Gallatin Check Station.

SYNOPSIS

*
* Long-term check station data shows no consistent *
* trend in change of age structure or antler-point *
* class of bull elk harvested. Some decline in the *
* proportion of the harvest that has been 6-point *
* or greater bulls has occurred, however, some *
* check stations had an increase in the harvest *
* of 6-point bulls during the past few years. *
* While the number of branch-antlered bulls checked *
* through one check station has shown an increase in *
* recent years, the percent of these bulls in the *
* total bull harvest, as well as the average age of *
* antlered bulls, shows a definite downward trend *
* from the early 1970's. A large increase (up to 6 *
* times since the late 1960's) of hunter numbers *
* through these check stations has contributed to the *
* perception by hunters that few large bulls are *
* present. *
*

Current Opportunity to Harvest a Branch-Antlered Bull

The percent of the bull harvest that is branch-antlered is indicative of bull turnover rates and thus age diversity among antlered bulls. When a large percentage of the antlered-bull harvest is branch-antlered, there is probably more age diversity than when this percentage is small. The larger this percentage, then, the more likely hunting opportunity is good for branch-antlered bulls.

With this assumption, information from the statewide harvest survey was evaluated for 1982-84 using the percent of branch-antlered bulls in the antlered harvest for each hunting district. Each hunting district was then placed in 1 of 4 opportunity to kill a branch antlered bull categories: $\leq 30\%$ = poor, 31-45% = fair, 46-60% = good, and $\geq 61\%$ = excellent. Distribution of these categories is illustrated in Fig. 20.

Numbers of hunting districts that fell in each of these categories were: 24 - excellent, 52 - good, 30 - fair, and 12 - poor. The area for each of these categories was also computed with the following results; 21% of the area where public elk hunting occurred during the general rifle season was classified as excellent, 43% = good, 28% = fair, 8% = poor.

These results suggest that the opportunity to kill a branch-antlered bull in Montana is still quite good. However, one must interpret these results cautiously when addressing management for

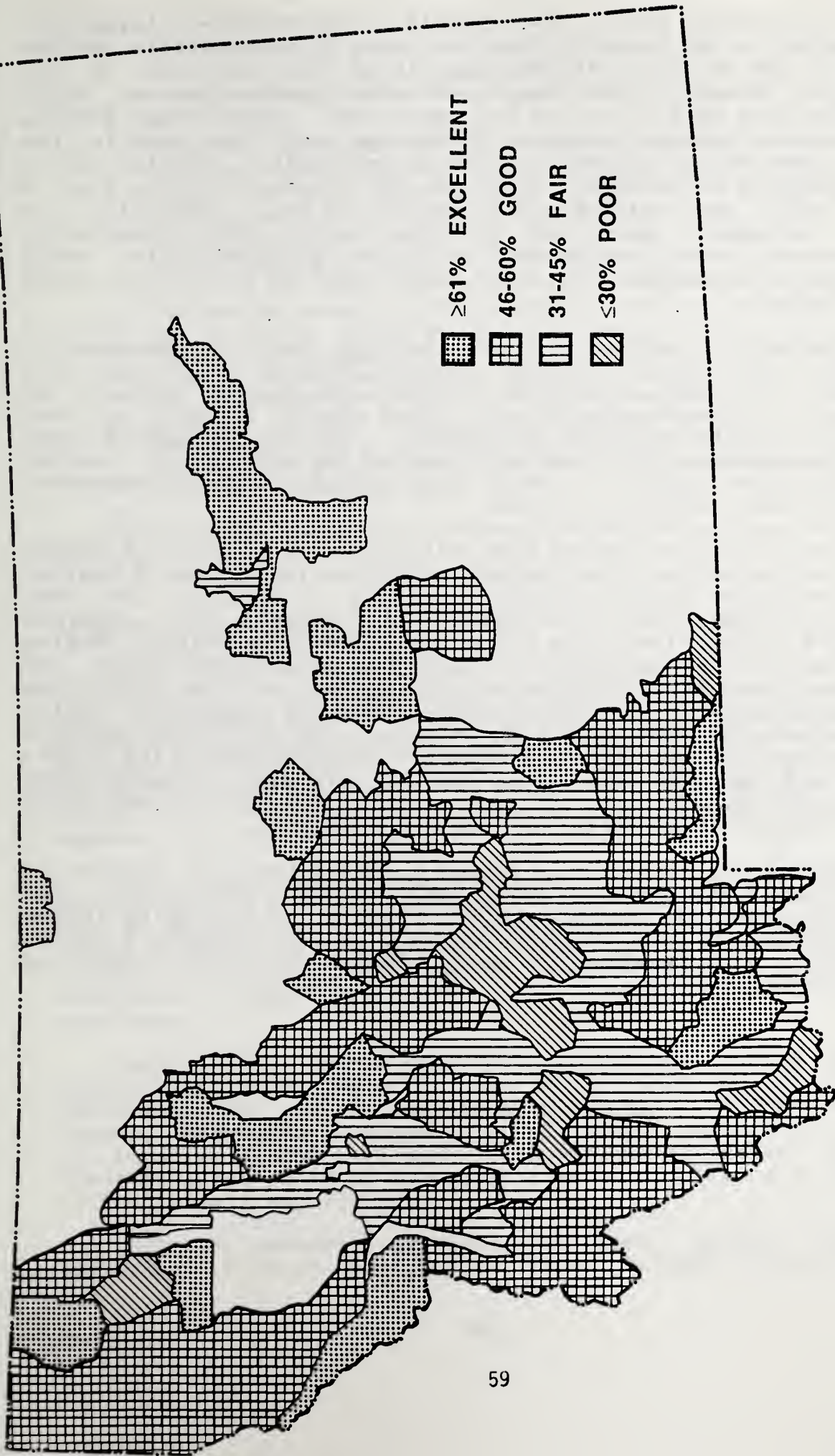


FIGURE 20. PERCENT OF BULL HARVEST BRANCH-ANTLERED DURING THE 1982-84 GENERAL RIFLE SEASON AS IT RELATES TO OPPORTUNITY TO KILL A BRANCH-ANTLERED BULL.

old (5-10 years) bulls. For example, the branch-antlered bull regulation in the Gravelly-Snowcrest area in southwestern Montana has put the hunting districts associated with this area in the excellent category, but most of the branch-antlered bulls harvested are only 2 1/2 - 3 1/2 years old. Before these hunting regulations were implemented, this area would have been in the poor opportunity category. Due to low habitat security and a large numbers of hunters, bulls are not likely to attain 5 or 6 years old, even with the branch-antlered bull regulation. In order to manage this area for old bulls, very restrictive regulations (eg. permits only for branch-antlered bulls) would have to be implemented to allow recruitment of bulls into older age classes.

Similarly, permit-only elk hunting may not necessarily produce old bulls. Portions of Region 5 have permit-only elk hunting, yet they fall into the poor opportunity category to harvest a branch-antlered bull. This occurs because of poor habitat security and more importantly, the elk management goal for these areas. Elk have been managed for general elk hunting and population control. Indeed, this has been the elk management goal for most Montana elk herds.

The number of record book elk taken in Montana in recent years versus earlier time periods should be indicative of current opportunity to kill a "trophy" bull elk in Montana. The most recent (1981) edition of Boone and Crockett (B&C) records contains 228 entries, 61 or 27% of which are from Montana. Twelve additional elk taken in Montana meet the minimum B&C score, but have not been officially entered into the records, including several taken after the latest record book was published. Of the 73 Montana elk meeting the minimum B&C score, 11 were taken in 1954 or before, while each subsequent decade (1955-1964, 1965-1974, and 1975-84) accounted for 23, 24, and 15 record book bulls, respectively. In addition, a new archery (Pope and Young) world record elk was taken in Montana in 1981.

Although the number of record book elk taken in Montana in recent years has declined somewhat, there are undoubtedly some recently taken elk that would be eligible for inclusion in the record book that have not been measured as yet. Despite this, it is obvious that Montana is still producing a fair number of record class bull elk.

SYNOPSIS

*
* Harvest information from the statewide harvest *
* survey was evaluated for 1982-84. Each hunting *
* district was placed in 1 of 4 categories *
* experiencing relative opportunity to kill a *
* branch-antlered bull: $\leq 30\%$ = poor, 31-45% = *
* fair, 46-60% = good, $\geq 61\%$ = excellent. The area *
* for each of these categories was computed with the *
* following results; 21 % of the area where public *
* elk hunting occurred during the general rifle *
* season was classified as excellent, 43% = good, 28% *
* = fair, 8% = poor. These results demonstrate that *
* the opportunity to kill a branch-antlered bull in *
* Montana is still quite good. Boone and Crockett *
* records indicate that the opportunity to harvest a *
* record book bull in Montana has declined somewhat, *
* but still remains high. *
*

EXPECTED TRADE-OFFS WITH RESTRICTED BULL ELK HARVEST REGULATIONS

Trade-offs in hunting regulations for bull elk outlined in the following discussion are relative to the basic objective stated in the department strategic plan. Establishing appropriate hunting regulations is a vital element in meeting the high hunting opportunity objectives. Furthermore, the public needs to be aware of the trade-offs that will occur in terms of overall hunter opportunity if restrictive bull seasons are implemented.

We have directed major attention to hunter opportunity and essential biological considerations. Revenue considerations will be significant if permit-only options are selected, but we have not addressed this issue. Similarly, we avoided discussing license structure that could require change; regulations considered could all be initiated with existing license structure.

Restrictive regulations are interpreted by some as added demands on the hunter with respect to field identification of bull elk. We did not address this because it tended neutralize itself, depending on one's point of view. Requiring a hunter to know more and have more field demands in terms of animal identification could be interpreted as a hardship or as a benefit to the overall experience.

Illegal harvest was addressed under several regulation options. Without doubt, some illegal harvest probably exists

under any hunting regulation. Much of the commentary traditionally associated with this issue has been poorly documented. It needs more precise evaluation as it relates to any regulation before being considered a primary issue. The branch-antlered regulation in the Gravelly-Snowcrest complex generated substantial speculation relative to illegal killing of spike bulls. Experience demonstrated that there was some illegal harvest, but the degree of that harvest did not significantly influence the intended result for which the regulation was established.

Some public objection can be anticipated any time a major change is proposed in hunting regulations. If the proposals are biologically sound, and if they are necessary to provide the most reasonable hunting opportunities, public acceptance may be high.

The bull elk regulation options discussed should apply to all hunting modes, including archery, rifle, and muzzle loading weapons.

Resulting potential hunter shifts from one locality to another were considered, but not discussed because of potential variability in hunter reactions. Experience and annual harvest survey results in a given region should enable us to monitor reaction patterns reasonably well.

Another option not considered was restricting hunters to a time period within a given season. These type of regulations relate more to controlling hunter numbers, and would probably not lessen hunter pressure on the bull segment of the population, especially if habitat security was quite limited.

Seven regulation types are discussed in order of increased restriction and reduced hunter opportunity. The major trade-offs are discussed in terms of implications as they relate to the overall elk hunting objective.

1. Any Bull Legal To All License Holders

- a) Provides greatest opportunity for licensed elk hunters to select hunting location and choice of animal.
- b) Maintains bull hunting regulations in simple format.
- c) Minimizes illegal kill opportunities on bull segment of the population.
- d) High hunter satisfaction with any bull regulation.
- e) Eliminates control of number of males taken, the location they are taken from, and the age class selected; provides little opportunity to maintain

wide diversity of age classes within the bull population.

- f) Can reduce the bull segment of populations below desired levels in habitats with low security.

2. Branch Antlered Bull Legal To All License Holders

- a) Provides opportunity for all licensed elk hunters to hunt any branch-antlered elk in any location.
- b) Maintains bull hunting regulations in simple format.
- c) Increases number of branch-antlered bulls in the immediate breeding and fall hunting season population (primarily 2-1/2 year old bulls).
- d) Provides legal protection to the unbranched (yearling) segment of the population.
- e) Present observations indicate high hunter satisfaction with branch-antlered bull regulations.
- f) Increases hunting pressure and harvest on the branch-antlered bull segment of the population, including the branched yearling segment.
- g) Provides a potential for illegal harvest of spikes.
- h) Allows carry-over of more yearling males than essential for breeding purposes. This is a problem only if carrying capacity of elk on existing ranges has already been reached. If so, it will reduce the number of cows and calves, which may reduce net reproductive potential, and the number of antlerless permits issued.
- i) Eliminates the opportunity to hunt spike bull elk.
- j) Reduces the total bull harvest.
- k) Provides no opportunity to maintain wide diversity of age classes within the bull segment of the population, except under high habitat security.

3. Point Regulations

- a) Provides good opportunity to maintain a diversity of age classes within the bull segment of the population.
 - 1) The degree of age diversity will vary with point demand of the regulation and the level of habitat security.

- b) May reduce hunting pressure and harvest on yearling and 2 1/2-year old bull segments (depending on point restriction).
- c) Provides good opportunity for all licensed elk hunters to hunt and kill any bull with legal antlers.
- d) Maintains bull hunting regulations in simple format.
- e) Provides potential for illegal kills (based on literature from other states and provinces).
- f) Allows carry-over of more subadult males than essential for breeding purposes. This is a problem only if carrying capacity of elk on existing ranges has already been reached. If so, it will reduce the number of cows and calves, which may reduce net reproductive potential, and the number of antlerless permits issued.
- g) May eliminate opportunities to hunt yearling and 2 1/2-year old bulls (depending on point restriction).
- h) Reduces the total bull harvest, depending on degree of mortality (natural and illegal hunting) that occurs on the protected segments prior to the time they are legally available to hunt.

4. Spike Bulls Legal To All License Holders And Branch-Antlered Bulls Legal Only By Permit

- a) Provides opportunity for all licensed elk hunters to hunt any spike bull.
- b) Eliminates winter carry-over of more yearling bulls than is essential for breeding purposes.
- c) Provides opportunity to establish and maintain a diversified age structure within the bull segment regardless of habitat security.
- d) Allows more yearling bulls with branched-antlers to enter the next year class.
- e) Maintains hunting regulations in simple format for hunter who wants to hunt spike bull elk.
- f) Eliminates opportunity for any licensed elk hunter to take a branch-antlered bull.
- g) Increases hunting pressure on spike segment of yearling population compared to the branch-antlered bull and 5-point regulation.

- h) . Increases potential for illegal harvest of branch-antlered bulls.
 - i) Requires a drawing for all branch-antlered bull hunting opportunities.
5. Sex Specific Statewide Licenses (eg. Antlerless-only A 7 Licenses)
- a) Should not significantly reduce bull harvest.
 - b) Should reduce hunter competition for any bull.
 - c) Should help improve landowner relations with regard to game damage problems.
6. Mandatory Waiting Period After Killing An Antlered-Bull
- a) Reduces hunter opportunity (number of hunters).
 - b) Requires department (and hunters) to maintain records for length of waiting period.
 - c) Not likely to increase numbers of branch-antlered bulls.
 - d) May reduce hunter competition.
7. Permit Only Elk Hunting
- a) Greatly reduces hunter opportunity (number of hunters).
 - b) Provides more control on harvest levels of all age classes of bull elk.
 - c) Provides opportunity to establish and maintain maximum diversity of age classes within the bull segment of the population under a public hunting system.
 - d) Reduces hunter competition.
 - e) Limits hunter to hunting location and to age and sex for all elk.
 - f) Requires a drawing for all hunter participation.
 - g) Allows carry-over of more males than essential for breeding purposes. This is a problem only if carrying capacity of elk on existing ranges has already been reached. If so, it will reduce the number of cows and calves, which may reduce net reproductive potential, and the number of antlerless permits issued.

Research

A management/research project was initiated in 1982 in the Elkhorn Mountains near Helena. This effort is in cooperation with the Helena National Forest (U. S. Dept. of Agriculture). Elk habitat relationships and population dynamics are being evaluated by this project.

A long-term research study was initiated by the Montana Dept. of Fish, Wildlife and Parks beginning in 1983 to also address elk management concerns and give the "Quality Hunting Issue" more biological information. Its objectives are:

1. To determine the effects of alternate hunting strategies and various harvest rates on elk population dynamics and habitat use due to the steady increase of hunting pressure and loss of habitat security.
2. To test the hypotheses that when mature bulls (2 1/2+ years) make up less than 5% of an elk population during the breeding season, the net reproductive success will be less compared to when the population has more than 5% mature bulls.
3. To assist biologists with evaluating existing elk population data and utilize the results from this study to better manage and understand the effects of various harvest rates and hunting season types on elk population dynamics.

As results from these studies become available, more light will be shed on the reproductive value of older bulls and the effects of various harvest rates on elk population dynamics and habitat use. This will provide the department with information on which to recommend future management of Montana's elk populations, and to provide for productive and healthy populations.

Conclusions

The 5-week general elk season has been maintained for 22 years, while the number of acres where we can potentially hunt elk is higher than ever. Either-sex elk hunting during the general season has been significantly reduced, while antlered-bull with antlerless permits, permit-only hunting, and branch-antlered bull hunting has increased considerably.

The harvest of branch-antlered bulls during recent years is higher than 20 years ago. This is a general reflection of more elk in Montana's elk populations. However, the increase in total elk numbers has not been followed by a like increase in numbers of branch-antlered bulls. In some hunting districts

where hunting pressure is high and habitat security is low, the number of older bulls has probably declined considerably, and more restrictive regulations on bull harvests may be necessary in the future. Change in the elk harvest questionnaire beginning in 1985 will provide more specific antler-point data and help us determine those hunting districts where the number of older bulls harvested is low.

A few patterns were evident in the change in the number of spikes and branch-antlered bulls harvested during 1970-72 vs. 1982-84. Harvest of spikes increased in 90%, remained stable in 7%, and declined in only 3% of the area open to general elk hunting. Harvest of branch-antlered bulls increased in 57%, was stable in 19%, and declined in 30% of the area open to general elk hunting.

Long-term check stations operated in the Bitterroot, Blackfoot, and Sun River areas show no consistent trend in change of age structure or antler-point class of bull elk harvested. Some decline in the proportion of the harvest that has been 6-point or greater bulls has occurred in the Bitterroot and Blackfoot; however, there has been an increase in the harvest of 6-point bulls during the past few years. An increase in number of hunters checked has resulted in more demand for a relatively stable number of large bulls. While the number of branch-antlered bulls checked through the Gallatin check station has shown an increase in recent years, the percent of these bulls in the total bull harvest, as well as the average age of antlered bulls, shows a definite downward trend from the early 1970's to 1983-84. Hunter numbers through this check station have doubled during the last 10 years. The large increase in hunter numbers through the Bitterroot, Blackfoot, and Gallatin check stations has contributed to the perception by hunters that few large bulls are present.

Harvest information from the statewide harvest survey was evaluated for 1982-84 and the percent of branch-antlered bulls in the antlered harvest was calculated for each elk hunting district. Based on this percentage, each hunting district was placed in 1 of 4 categories experiencing relative opportunity to kill a branch-antlered bull: $\leq 30\%$ = poor, 31-45% = fair, 46-60% = good, $\geq 61\%$ = excellent. The number of hunting districts occurring in each of these categories were; 24 - excellent, 52 - good, 30 - fair, 12 - poor. The area for each of these categories was also computed with the following results; 21 % of the area where public elk hunting occurred during the general rifle season was classified as excellent, 43% = good, 28% = fair, 8% = poor.

These results demonstrate that the opportunity to kill a branch-antlered bull in Montana is still quite good. However, one must interpret these results with caution when addressing management for older bulls. Elk have been managed in most of Montana for the purpose of general elk hunting and population control, not for old or trophy bulls.

Boone and Crockett records indicate that the opportunity to harvest a record book bull in Montana has declined somewhat, but still remains good.

Various trade-offs associated with restrictive bull harvest regulations indicate each reduces hunting opportunity to some degree. History and records from other states and nations clearly show that the ultimate result of reduced hunting opportunity is increased apathy by the public sector toward wildlife issues.

A management/research effort began in the Elkhorn Mountains in 1982 with cooperation from the Helena National Forest. A long-term research study was initiated by the Montana Department of Fish, Wildlife and Parks during the winter of 1983-84 to also address elk management concerns and give the "Quality Hunting Issue" more biological information. As results from these efforts become available, more light will be shed on the reproductive value of older bulls and the effects of various harvest rates on elk population dynamics and habitat use. This will provide the department with valuable information to make recommendations on the future management of Montana's elk populations and to provide for productive and healthy populations.

It is obvious that providing for good elk hunting opportunity in Montana has not been ignored in the past. It is also important to note that department personnel deal with land management agencies almost daily with respect to road closures, timber harvest methods and timing of cuts, and maintaining roadless areas, all of which are vital to providing secure elk habitat. This active involvement by department personnel helps maintain a diverse age structure of bulls in various populations, maintain a better distribution of the bull harvest throughout the hunting season, prevent additional hunting season restrictions and provide the public with good opportunity and freedom of choice to hunt elk in Montana.

